

No. 825,731.

PATENTED JULY 10, 1906.

L. D. JANNELL.
PUNCHING AND SHEARING MACHINE.

APPLICATION FILED FEB. 9, 1906.

2 SHEETS—SHEET 1.



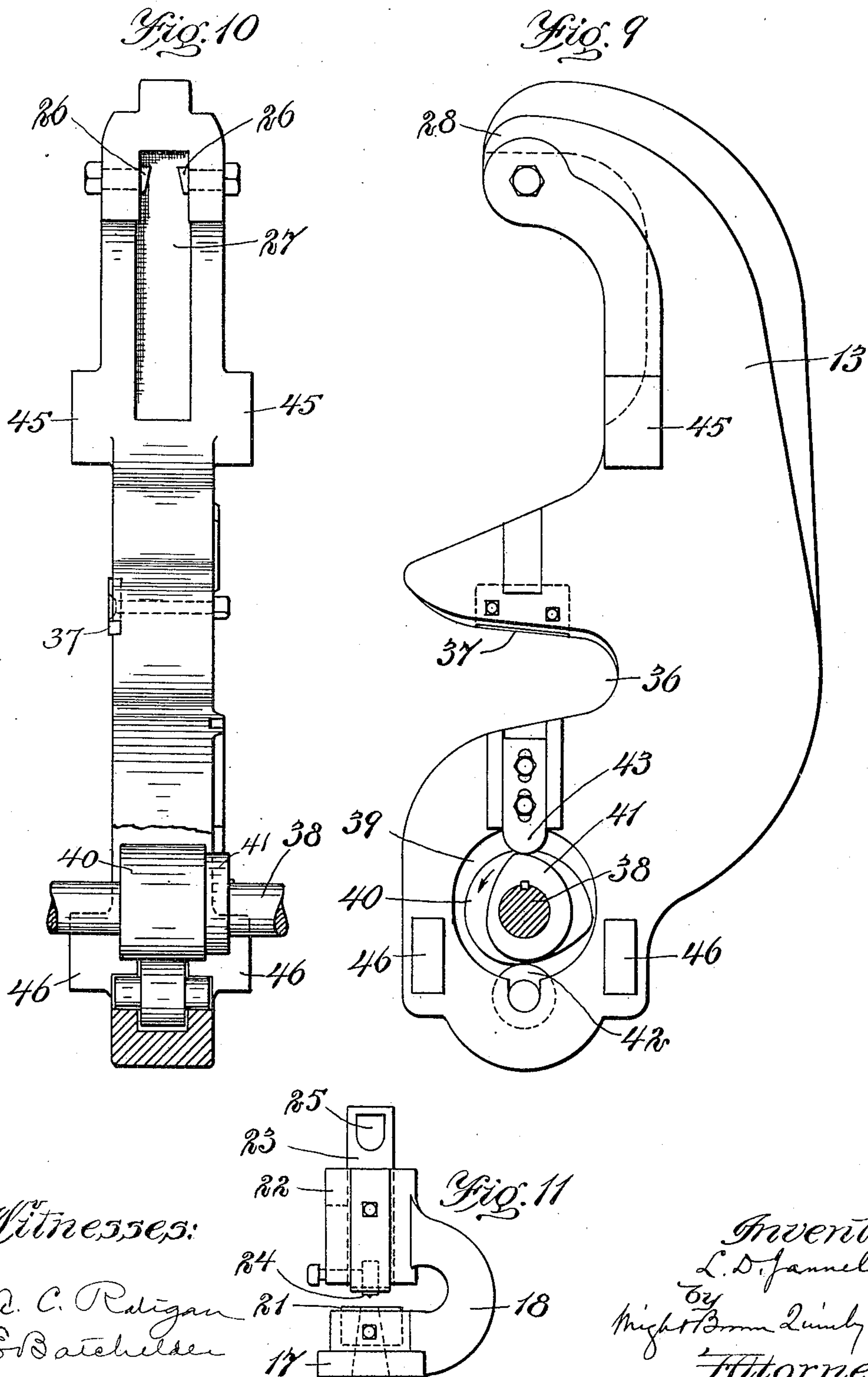
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UNITED STATES PATENT OFFICE.

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PUNCHING AND SHEARING MACHINE.

No. 825,731.

Specification of Letters Patent.

Patented July 10, 1906.

Application filed February 9, 1906. Serial No. 300,255.

To all whom it may concern:

Be it known that I, LESLIE D. JANNELL, of Rumford, in the county of Oxford and State of Maine, have invented certain new and useful Improvements in Punching and Shearing Machines, of which the following is a specification.

This invention relates to machines for punching and shearing or cutting metal articles, such as tires, hoops, I-beams, angle-irons, and other metallic articles of various regular and irregular shapes.

The invention has for its object to provide a simple and efficient machine for the above-named purpose adapted to perform all kinds of work required by the shape of the article submitted to the machine and adapted to utilize the power applied with the minimum loss of power by frictional and other resistances.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of a machine embodying my invention. Fig. 2 represents a front elevation of the same. Fig. 3 represents a section on line 3 3 of Fig. 1. Fig. 4 represents a section on line 4 4 of Fig. 1. Figs. 5 and 6 represent side elevations showing different forms of an improved punch constituting a part of my invention. Figs. 7 and 8 represent end views of the punches represented in Figs. 5 and 6. Fig. 9 represents a side view of the carrier hereinafter described and a portion of the mechanism for reciprocating the same. Fig. 10 represents a front elevation of the parts shown in Fig. 9, the lower portion of the carrier being broken away and shown partly in section. Fig. 11 represents a side view of the removable punch holding and guiding yoke hereinafter referred to.

The same numerals of reference indicate the same parts in all the figures.

In the drawings the supporting-frame of the machine is shown as composed of two side pieces 12 12, which are separated throughout the greater part of their area to form an intermediate space, in which a carrier 13 is vertically movable. The side pieces 12 meet at the forward upper portion

of the frame to form a seat 14, Fig. 2, which is substantially horizontal and is provided at its edges with guides 15 16, 55 formed to overhang the base 17 of a punch holding and guiding yoke 18. The edges of the base 17 are formed to engage the guides 15 16, the meeting edges of the guides and base being of dovetail form. The guide 16 is 60 movable and is secured in place by a screw 20, so that it may be removed or loosened to permit the removal of the yoke and tightened to clamp the yoke firmly in place on the seat 14. The yoke is provided with a socket for a 65 female punching-die 21 and with a guide 22, overhanging said socket, for the holder 23 of a male punching-die 24, adapted to cooperate with the die 21. Since the punching-die 24 and its holder 23 act as one part, I will hereinafter refer to the holder 23 as a "movable" 70 punching-die.

The movable punching - die 23 projects above its guide and is provided at its upper end with means whereby it may be detachably engaged or coupled with complemental 75 coupling members on the carrier 13 by a movement of the yoke 18 to its operative position on its seat. The coupling means or members on the punching-die 23 are here 80 shown as notches 25, formed in opposite sides of the die, the coupling members on the carrier being the studs 26, projecting into opposite sides of a recess 27, formed in the overhanging head 28 of the carrier 13. The 85 head 28 overhangs the seat 14 and is arranged so that when the yoke 18 and the punching-dies connected therewith are moved to place on the seat 14 the punching-die 23 is by this movement engaged with the head of the carrier, so that the punching-die 23 will move 90 with the carrier. It will be seen that the yoke 18 provides for the ready application to and removal from the machine of different sets of punching-dies adapted to make holes 95 of different sizes and shapes.

The side pieces of the supporting-frame are provided below the seat 14 with recesses 29, which form a throat adapted to receive a tire 30 (shown by dotted lines in Fig. 2) or any 100 other piece of work to be sheared by the operation of the machine. One of the side pieces 12 is provided at the lower edge of the recess 29 therein with a fixed shear-blade 31,

which is preferably secured to the side piece 12 as follows: The said side piece is provided with a cavity 32, having three walls, one side of said cavity opening into the recess 29.

5 One end of the cavity 32 is dovetailed to overhang one of the dovetailed ends of the shear-blade 31. The blade is shorter than the cavity 32, so that a space exists between its opposite end and the adjacent end of the
10 cavity. 33 represents a bolt engaged with the side piece 12 and having a head 34 occupying said space, one side of the head being dovetailed and engaging the adjacent end of the shear-blade 31. The bolt 33 has a nut
15 35, which when tightened causes the bolt to engage and firmly hold the shear-blade. The carrier 13 is provided with a corresponding recess 36, which coincides with the recesses 29. To the carrier at the upper edge of the
20 recess 36 is secured, preferably in the manner above described, a fixed shear-blade 37, adapted to cooperate with the fixed shear-blade 31 when the carrier descends.

38 represents an operating-shaft journaled
25 in bearings in the lower portion of the supporting-frame and extending through an opening 39 in the lower portion of the carrier 13. To the shaft 38 are affixed two operating-cams 40 41. These cams are arranged
30 side by side and are formed to act in opposite directions on the carrier. The perimeter of the cam 40 is in contact with a roll or rolling abutment 42, journaled in the carrier, and the perimeter of the cam 41 is in contact
35 with an adjustable piece or abutment 43, secured to the carrier above the shaft 38. The shaft 38 is rotated by power applied in any suitable way, as hereinafter described. During a part of its rotation the cam 40 acts to
40 depress the carrier and cause the punching and cutting or shearing members to operate, and during the remaining part of a complete rotation of the shaft the cam 41 acts to raise or retract the carrier. The cam 40 is of
45 larger size and has a greater leverage than the cam 41. Hence the power exerted in depressing the carrier is greater than that in retracting the carrier. The cams and their abutments are arranged so that the points of
50 contact between the cams and the abutments are substantially in vertical alinement with the center of the shaft. The punching members are also arranged so that their vertical centers are in alinement with the center of
55 the shaft and with the points of contact of the cams therewith. The shear-blades extend substantially at right angles with the shaft 38 and are arranged so that their central portions are substantially in alinement
60 with the center of the shaft 38 and with the centers of the punch members. The described arrangement of the operating parts enables the power to be advantageously applied and prevents any liability of lateral

movement or springing of the frame and other 65 parts of the machine by the stresses set up therein during the punching and shearing operations.

The carrier 13 is provided with upper guide members 45 and with the lower guide 70 members 46, said guide members engaging complementary guide members in the inner sides of the side pieces of the frame. The guide members 45 are located above the shear-blades 38, while the guide members 46 75 are located wholly or mainly below the shear-blades. This arrangement of the guide-members contributes to the steadiness and ease of operation of the machine and prevents any tendency of the carrier to bind or
80 stick on its bearings. The abutment 43 is adjustable by means of slots and bolts, as shown in Fig. 9, so that it may be moved to compensate for wear of its lower end.

I have provided power mechanism and 85 hand-operated mechanism adapted to be used interchangeably to rotate the shaft 38. The power mechanism includes a driving-shaft 48, connected by a suitable train of gearing with the shaft 38, as indicated in 90 Figs. 1 and 2, the said driving-shaft being driven by a pulley 49, normally loose on the shaft and adapted to be engaged therewith by a clutch 50, forming a part of an automatic stop-motion adapted to arrest the ro- 95 tation of the driving-shaft after each descent and retraction of the carrier, so that unless the operator depresses a treadle 51 on a lever connected with the automatic stop-motion the machine will stop after each retraction of 100 the plunger. The hand-operated mechanism includes a hand-lever 52, mounted to oscillate upon the shaft 38 and carrying a pawl 53, which normally engages a ratchet 54, affixed to the shaft 38. When the lever is 105 oscillated, the pawl and ratchet impart a step-by-step rotation to the shaft 38. When the machine is operated by power, the pawl 53 may be locked by any suitable means out of engagement with the ratchet 38. 110

The punch 24 is shown in Figs. 5, 6, 7, 8 as of cylindrical form, its acting end being stepped. In Figs. 5, 7 the stepped end has two faces 56 57, the lower step 56 having a cutting edge 58. In Figs. 6, 8 the cutting 115 end has three steps 59 60 61. The lower step 59 has two radial cutting edges 62, while the step 60 has a single radial cutting edge 63. This formation of the acting end of the punch enables it to form a hole by suc- 120 cessive operations, so that less power is required.

The faces of the stepped portions of the acting end of the punch are in planes transverse to the horizontal axis of the punch, and 125 the side face from one transverse face to the other is substantially at a right angle to said transverse faces. Therefore, as is obvious,

one portion of the die will complete its operation to form a part or one side of a hole and then the next portion of the die will act on the part of the metal at one side of the part first acted on. In other words, a piece of metal of small area may be entirely removed by an abrupt cutting action before the next piece of metal at one side is removed, so as to complete the formation of the hole.

10 The punch is provided with a centering projection 64, arranged on the axial line of the punch, this projection entering the prick-punch made in the work to locate the center of the punched hole.

15 The head 28 of the carrier is made of a relatively small cross-sectional area, as indicated by Figs. 1, 2, 9, 10, so that it may be encircled by a tire or hoop 65, (see dotted lines in Fig. 2,) presented to the punching members. The machine is therefore adapted to punch tires, hoops, and other annular bodies of various sizes from a relatively small size to a practically unlimited size.

25 The punch holding and guiding yoke 18 when in place occupies a space between the seat 14, which is located directly above the shear-blades and the overhanging head 28. When the yoke 18 is removed, this space may be utilized to receive the upper portion of an annular body 30, such as a tire, the lower portion of which is presented to the shear-blades. Provision is thus made for shearing tires, hoops, &c., of various sizes.

35 The sides of the frame in which the recesses 29 are formed are externally unobstructed, so that straight pieces of work presented either to the punching-dies or to the shear-blades may project to any desired distance from the sides of the machine. The machine is therefore adapted to operate on a great range or variety of work and is at the same time very compact in construction, so that it occupies a relatively small floor-space.

I claim—

45 1. In a combined punching and cutting machine, the operating-shaft arranged transversely to the line of the cutting-blades, said shaft, the center of the cutting-blades and a punch operated from the same shaft being in substantially the same plane, and said punch and cutting mechanisms having feed-openings facing in the same direction.

55 2. A punching and shearing machine comprising a supporting-frame having a fixed punch member at its upper portion, and a fixed shear-blade located below the fixed punch member, a carrier movable vertically in the frame and having a punch member and a shear-blade arranged to cooperate respectively with the fixed punch member and fixed shear-blade, and an operating-shaft located below the shear-blades and having oppositely and alternately acting cams engaging the carrier at points at opposite sides of

the shaft and substantially in alinement with the punch members and with the central portions of the shear-blades, one of the cams being formed to depress the carrier with a relatively slow motion while the other is formed to raise the carrier with a relatively quick motion.

3. A punching and shearing machine comprising a supporting-frame, a movable carrier guided thereby in a substantially vertical path, said frame and carrier having complementary cutting members which are caused to cooperate by movements of the carrier, and an operating-shaft provided with two oppositely-acting cams, one cam acting to project the carrier and cause the action of the cutting members, and the other cam acting to retract the carrier, the frame and carrier being formed with laterally-opening recesses to permit the feed of wide or circular pieces of work to the said cutting members.

85 4. A punching and shearing machine comprising a supporting-frame, a movable carrier guided thereby in a substantially vertical path, said frame and carrier having complementary cutting members which are caused to cooperate by movements of the carrier, and oppositely-facing abutments at its lower portion, located substantially in alinement with the said cutting members, and an operating-shaft provided with two oppositely-acting cams cooperating with said abutments, one cam acting to project the carrier and the other to retract the carrier, the frame and carrier being formed with laterally-opening recesses to permit the feed of wide or circular pieces of work to the said cutting members.

105 5. A punching-machine comprising a supporting-frame having a substantially horizontal seat provided with guides, a die holding and guiding yoke having a base movable on said seat between the guides, complementary punching-dies, one attached to the yoke and the other movable therein, the movable die having coupling members, and a reciprocating carrier having a head overhanging the seat, said head and movable die having complementary coupling members adapted to be interlocked by a movement of the yoke to its operative position on the seat.

115 6. A punching-machine comprising a supporting-frame having a punch member, a guide above said punch member, a reciprocating carrier having a head overhanging the guide and the punch member, and a punch member movable in said guide and engaged with the overhanging head, the said head being of relatively small cross-sectional area, so that it may be surrounded by an annular body presented to the punching-dies, and the said guide and the two punch members being removable as a unit from the supporting-frame.

125 7. A punching and shearing machine com-

prising a supporting-frame having a substantially horizontal seat at its upper forward portion, and a fixed shear-blade located below said seat, a die holding and guiding yoke
5 movable horizontally to and from said seat, complementary punching-dies, one attached to the yoke and the other movable therein, and a reciprocating carrier movable vertically in the frame and having an upper end project-
10 ing above the frame and overhanging the seat said overhanging end being provided with means for detachably engaging the movable die when the yoke is in its operative position upon the seat, the carrier having also a shear-
15 blade arranged to cooperate with the fixed shear-blade, the said yoke occupying a space directly above the shear-blades and between the seat and the overhanging end of the carrier, so that the removal of the yoke permits
20 the utilization of said space for the reception of the upper portion of an annular body subjected to the shear-blades.

8. A punching and shearing machine comprising a supporting-frame, a carrier movable
25 thereon, said frame and carrier having complementary cutting members caused to act by movements of the carrier, a rotary operating-shaft having means for engaging and reciprocating the carrier, the frame and carrier being
30 formed with laterally-opening recesses to permit the feed of wide or circular pieces of work to the said cutting members, a power mechanism for rotating said shaft, said mechanism having an automatic stop-motion for
35 rendering it inoperative, and a hand-oper-

ated shaft-rotating mechanism adapted to be used interchangeably with the said power mechanism.

9. In a machine of the character stated, a shear-blade holder having a three-sided recess, one of the end walls of which overhangs
40 the bottom of the recess, a shear-blade adapted to enter said recess and having shouldered ends, the blade being shorter than the recess, so that a space exists between one of its ends
45 and the corresponding end of the recess when the blade is in place, and an attaching-bolt engaged with the holder and having a head occupying said space, one side of the head being formed to overhang the adjacent end of
50 the shear-blade.

10. In a machine of the character stated, a male punch having a stepped acting end, the faces of the stepped portions being in planes
55 transverse to the longitudinal axis of the punch, and the side face from one transverse face to the other being radial and substantially at a right angle to said transverse faces, whereby one portion of the die may complete its operation to form part of a hole and
60 then the next portion of the die may act on a part of the metal at one side of the part first acted on.

In testimony whereof I have affixed my signature in presence of two witnesses.

LESLIE D. JANNELL.

Witnesses:

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