(No Model.) 4 Sheets—Sheet 1.

M. MORTON.

REVERSIBLE UNIVERSAL SHAPER.

No. 472,061. Patented Apr. 5, 1892.

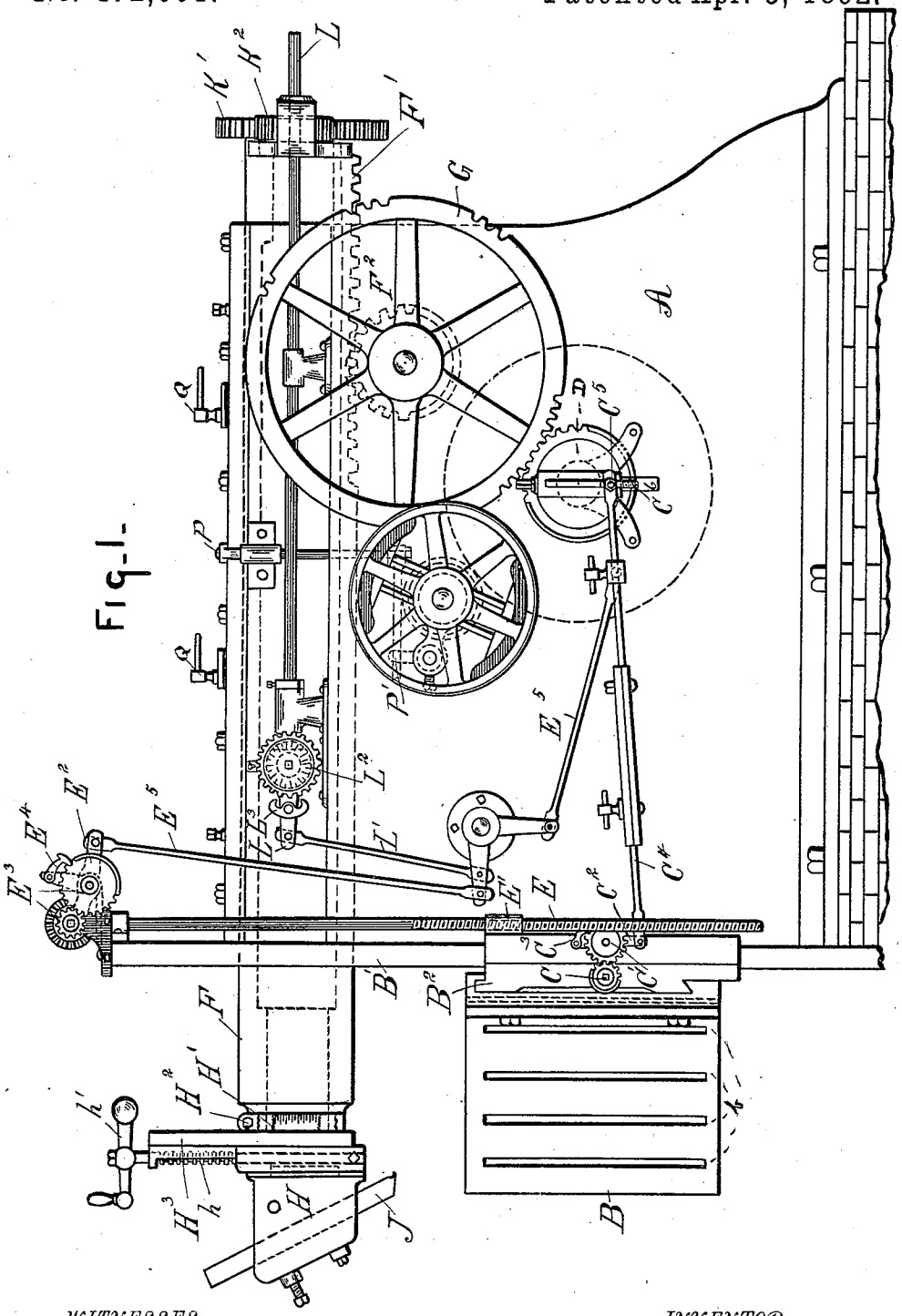

Fig. 1.

WITNESSES

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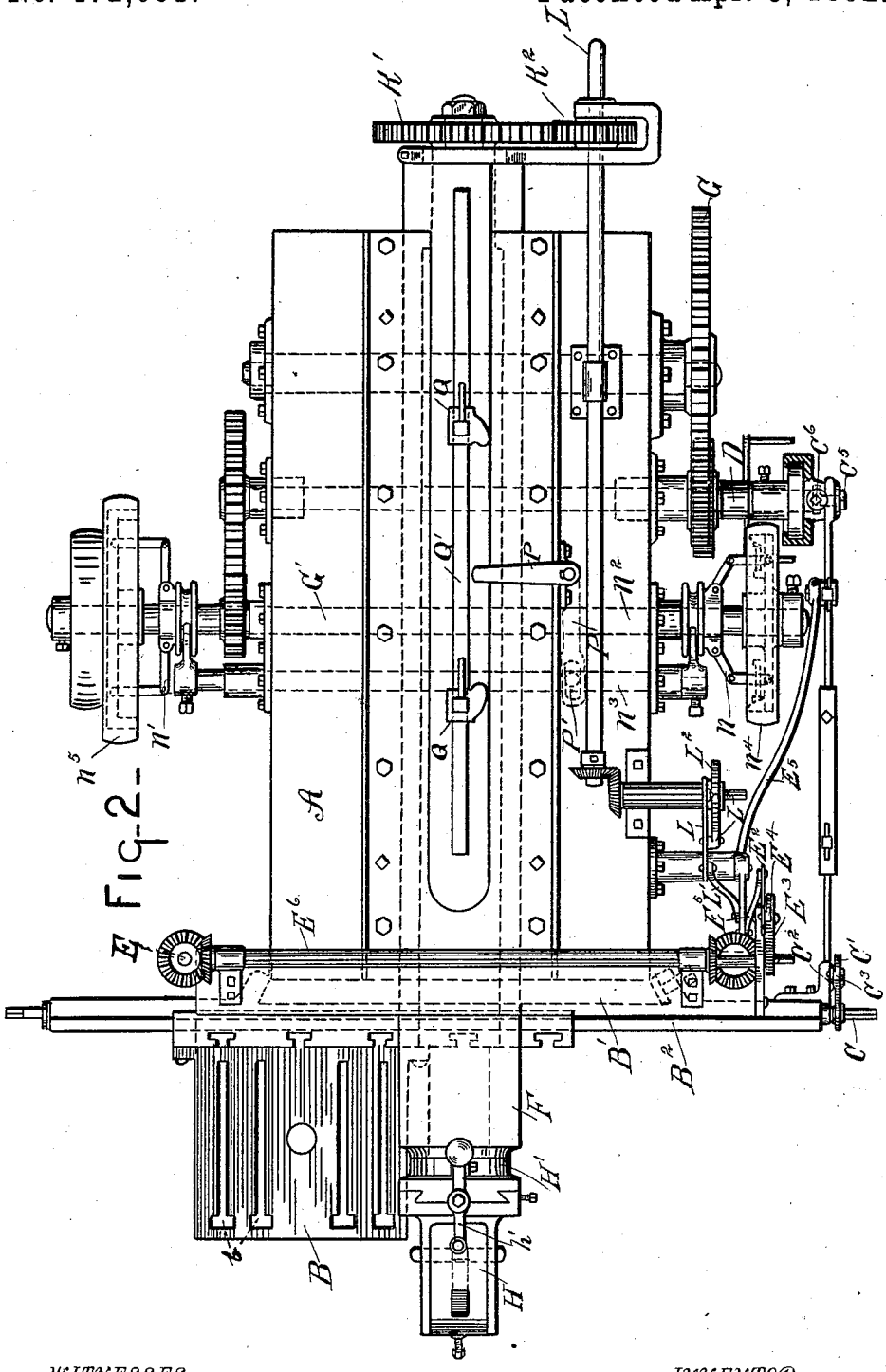

FIG. 2.

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Fig. 3.

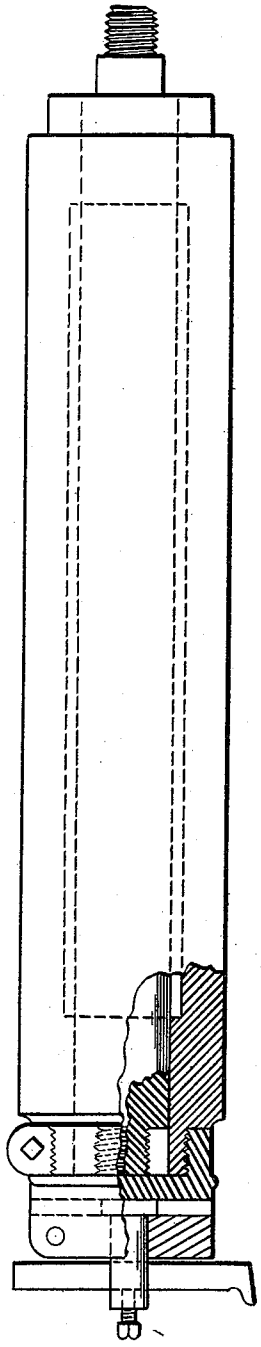


Fig. 4.

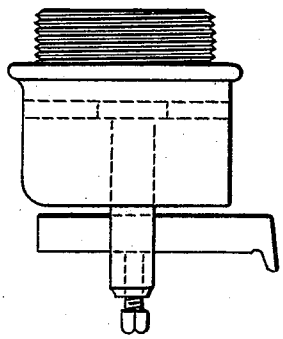
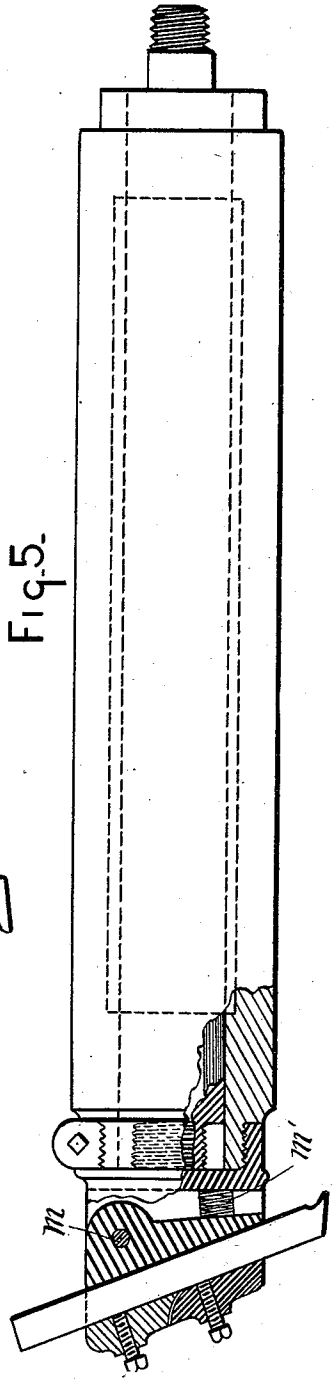


Fig. 5.



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(No Model.) 4 Sheets—Sheet 4.

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REVERSIBLE UNIVERSAL SHAPER.

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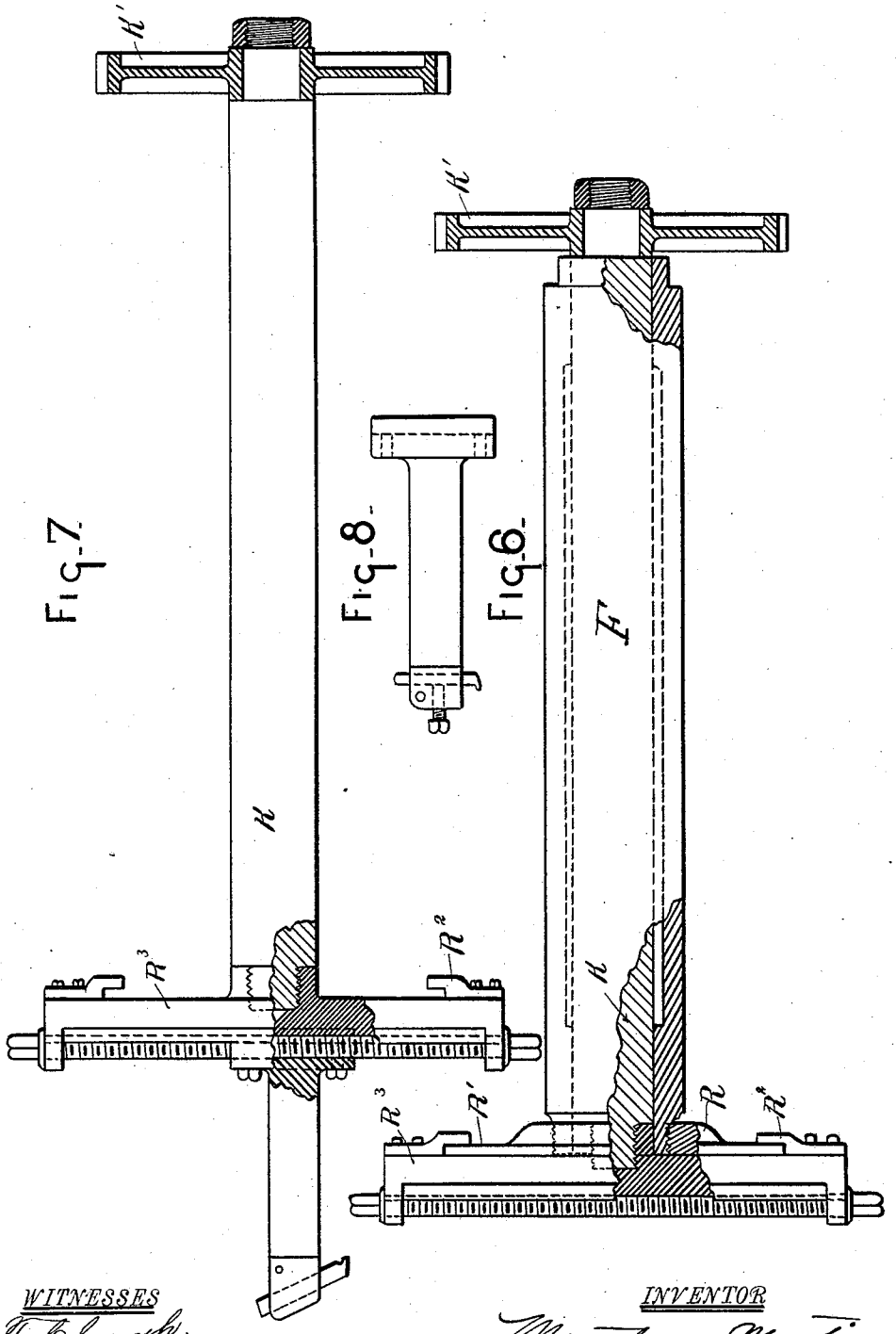

WITNESSES

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UNITED STATES PATENT OFFICE.

MATTHEW MORTON, OF ROMEO, MICHIGAN.

REVERSIBLE UNIVERSAL SHAPER.

SPECIFICATION forming part of Letters Patent No. 472,061, dated April 5, 1892.

Application filed February 16, 1891. Serial No. 381,562. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW MORTON, a citizen of the United States, residing at Romeo, county of Macomb, State of Michigan, have invented a certain new and useful Improvement in Reversible Universal Shapers; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

In the drawings, Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is a plan view of the same. Figs. 3, 4, and 5 are views of the different heads and plunger. Fig. 6 is a view of the ram and revolving head. Fig. 7 is a view of the axial shaft and revolving head. Fig. 8 is a view of tool arranged for a pushing cut.

It is the purpose of my invention to produce a shaper wherein its cutting-tool is adapted to operate with a drawing cut; also, in the provision of means whereby the same may be reversed and operated with a pushing cut; also, in the provision of a cutting-tool connected with a reciprocating ram or plunger, said cutting-tool adapted to be rotated circumferentially about said supporting ram or plunger, whereby its cutting-tool may be presented in any direction in its plane of revolution, and means for fastening the same rigidly in any said position of adjustment; also, in the provision of a shaft passing axially through the reciprocating ram or plunger, said shaft adapted to receive the head which supports the cutting-tool upon its end. Said shaft provided at its other end or at some point thereon with feeding-gears connected with feeding mechanism, whereby after each cut the said head, with its tool, may be adjusted circumferentially about the axis of the shaft and locate the same properly for each successive cut; also, in other special features of construction which will be hereinafter specified and claimed.

In carrying out my invention, A is a suitable frame-work. B is a table for supporting the article to be shaped. This table is provided with any usual adjusting-slots *b* along its upper face, and similar slots *b'* may be provided upon its vertical faces for the ready connection therewith of the article to be shaped. This table or support may be vertically adjustable and also horizontally adjustable. I accomplish this vertical and horizontal adjustment for the purpose of locating the work in the first instance, preparatory to starting the machine by operating the feeding mechanism, by means of cranks located on the screw-rods C and E, the screw-rod E serving to elevate the table-support B^2, and the screw-rod C operated to move the table B on its support horizontally. By means of these adjustments the article to be shaped may be brought into proper juxtaposition with the shaping-tool. When once brought into its proper position with respect to the tool, the horizontal feed is accomplished by feeding mechanism consisting of the adjusting-screw C, geared with pinion C', which in turn is operated by lever C^2, bearing pawl C^3, engaging the lever with the pinion. At the opposite end of the lever a pitman or connecting rod C^4 leads to a crank-pin or eccentric C^5 on the shaft D, so that at every revolution of the shaft D the pinion C' is turned through a certain fraction of a revolution, thus effecting a corresponding revolution of the screw-shaft C and a certain definite horizontal feed of the table B. The extent of this feed is determined by the amount of throw given to the pinion C', and this is regulated by an adjusting-screw C^6, whereby the wrist-pin or crank C^5 is adjusted toward or from the center of the shaft D.

The vertical feed of the table B is effected in like manner by screw-shafts E, attached by means of the screw-threaded portions E' of the support B^2. These shafts gear at their upper extremities through a bevel-gear with the horizontal shaft E^6, which receives its motion through lever E^2, pawl E^4, pinions E^3, and connecting-rods or pitmen E^5, whereby the same is engaged with the shaft D, and so a vertical feed is communicated to the table B at each revolution of the shaft D.

F is a plunger or ram, which supports the cutting-tool. It is caused to reciprocate back and forth by a rack-bar F', which engages a pinion F^2 on the shaft of the actuating-wheel G.

H is a head, which supports the tool J. The head H is connected with the ram or plunger F by a clamping-collar H', held by a bolt or

clamp-screw H^2. By loosening this clamping-collar the head may be rotated about the axis of the plunger, so as to bring the cutting-edge of the tool circumferentially into any desired position about the axis of the plunger. This clamping-collar is formed integral with the head H and is screw-threaded internally and adapted to screw on the plunger, the clamping-bolt merely springing the same together to fix it firmly on the threaded portion of the plunger. The portion H of the head is engaged with a separate portion H^3, so as to slide longitudinally thereon, and an adjusting-screw h, provided with a handle h', is swiveled to the part H^3 and engages the head H and affords means for adjusting the tool to or from the work. This adjusting-screw is preferably in the same plane with the tool J and the axis of the ram or plunger. It will be observed that the tool J is so adjusted that the tool cuts by a drawing cut on its movement toward the face of the machine. It may be arranged by removing head H and substituting head shown in Fig. 4, so as to cut by a pushing cut as it moves in a direction outwardly from the face of the machine. If only head H is provided, the pushing cut can be obtained by turning the head half round and inverting the tool.

K is a shaft passing axially through the ram or plunger F. It is at its end adapted for the reception of the tool-head R^3. At its other end it is provided with gear K', whereby it is engaged with the shaft L of a feeding mechanism through gear K^2, the pinion K^2 being engaged with said shaft by a spline-and-groove connection, so as to maintain its engagement with the shaft L as the plunger reciprocates. The shaft L derives its motion from the shaft D or other like shaft through the medium of cutting-rods or pitmen E^5 L', pinion L^2, pawl L^3, and lever L^4 the same, essentially, as described of the other feeding mechanism, so that at each revolution of the shaft D the tool-head R^3 is rotated about the axis of the shaft K sufficiently to enable the tool to make its successive cuts. The tool-heads are preferably provided in all cases with any suitable relieving mechanism—as, for instance, the pivoted support m and spring m'—whereby it may ride back freely on its return movement after making a cut.

n n' are clutches, and preferably frictional clutches, one located at each end of the drive-shaft n^2.

n^3 is an actuating-bar adapted to actuate both said clutches, throwing one into engagement with its own pulley as the other one is thrown out of engagement with its pulley. These pulleys n^4 n^5 are connected in any usual way with the driving mechanism, so as to run in opposite directions.

P is a clutch-shifting lever engaged with the bar n^3 by a slot-and-pin engagement at P'.

Q Q represent tappets made adjustable longitudinally to any desired positions in the slot Q', and they move with the plunger or ram F. Now when the plunger is moving in one direction one of the tappets eventually strikes the clutch-lever P, thus shifting the rod n^3. This disengages that pulley n^4 which has been actuating the plunger and engages the shaft G' with the other pulley n^5, which reverses the motion of the plunger, causing it to move in the opposite direction. The other tappet eventually strikes the lever P and again reverses the motion of the plunger, so that by a proper adjustment of the tappets the cutting-tool is caused to travel through just the required limits to perform its work. The pulley n^5, being larger than the pulley n^4, serves to gig back the tool with much greater speed than it moves forward while making its cut. It is manifest from this construction that by simply reversing the direction of motion of the belts that communicate motion to the pulleys n^4 and n^5 by the ordinary means of reversing counter-shaft by open and cross belts the plunger, with its tool, is caused to reverse its action—that is to say, while before it moved forward slowly in a direction from the face of the machine it will now move slowly while moving in a direction toward the face of the machine, and whereas before it was gigged back rapidly in a direction away from the face of the machine it will now be gigged back rapidly while moving in a direction toward the machine. This enables me to adapt the machine for making a drawing cut or for making a pushing cut, and necessitates simply the change of the tool-head, so as to hold the tool in proper position in either case.

When the head R^3 is engaged with the shaft K, as shown in Fig. 7, it might lack sufficient support about its periphery. I would therefore in that case provide upon the plunger F a separate supporting-ring R, adapted to be screwed thereon, said ring having an annular flange R'.

R^2 represents engaging-cleats secured to the head R^3, which embrace the flange R' at its periphery and slide along the said flange as the head is rotated by its feeding mechanism. This gives to the head an ample support.

Figs. 3, 4, and 5 show details of the plunger and rotating shaft with the means of attaching the tool-head to them. In Fig. 3 the tool-head is shown attached to the rotating shaft and adapted to the pushing cut. Fig. 4 shows a tool-head that may be used for either a pushing or drawing cut by simply turning the head over. Fig. 5 shows a tool-head adapted to a drawing cut alone. The form shown in each of these figures is for use in cases where an adjustable tool-head like that shown in Fig. 6 is unnecessary.

The advantages of this construction are very many, among which are the following:

First. The tool is adapted to operate by a drawing cut. This is a much steadier cut than a pushing cut, and the tool will therefore operate to better advantage.

Second. It enables the work to be marked

out upon its outer surface, where the marking is always visible. It is well known that by reason of the chipping of the metal as it finishes its cut it is impracticable to mark out the pattern upon that side of the work. If the tool, therefore, operates by a pushing cut, as is usual in machines of this class, the pattern-lines would be out of sight upon that side adjacent to the face of the machine, while with my apparatus, since the tool operates by a drawing cut, the pattern may be upon the outer surface farthest away from the face of the machine at the side where the tool enters the work.

Third. It is adapted to operate either by a drawing cut or by a pushing cut, requiring simply the change of the tool-head, so that it is adapted for doing work which can only be done readily by a pushing cut.

Fourth. Adapted as it is to operate usually by a drawing cut, all the supporting parts of the table are drawn snugly against the face of the machine and their connecting-surfaces are not subjected to wear, as they are where the tool operates by a pushing cut. The machine is, therefore, not so liable to get out of order by reason of lost motion between the parts of its supporting-table due to wear.

Fifth. When operating with a drawing cut, there is no liability of springing the table downward, a trouble which exists where the tool is operated by a pushing cut.

Sixth. The facilities for rotating the head about the axis of the plunger fits the tool for working dressing almost in shape—such, for instance, as the various parts of pillow-blocks, straps for the connecting-rods of engines, and like work.

Seventh. The shaft K, with the tool-holder H and means for giving to it a rotary feed, facilitates very greatly the dressing of the interiors of hubs, or the brasses for locomotive-axles, or the seats for the brasses in locomotive-pedestals, and any similar case where the throat into which the tool is projected is small and contracted, and in cases of that character I would have it understood that the head need not be provided with the adjusting mechanism *h h'*, but may be constructed essentially as shown in Figs. 3, 4, and 5.

Eighth. Where the tool operates with a drawing cut, it is entirely practical to locate any suitable blocking or supports between the work and the face of the machine, which would not be practicable with a pushing cut, and, in fact, the machine is adapted to do almost all varieties of inside and outside shaping.

By the use of a pit immediately in front of the machine and extending the face-plate into it work of great length can be planed by setting it up against the face-plate and using the drawing cut.

What I claim is—

1. In a shaper, the combination of the plunger provided with a head for receiving a tool-holder, actuating mechanism for reciprocating said plunger with a slow motion in one direction and a quick return in the opposite direction, and means for changing the direction of motion of the main driving-pulley, whereby the relative direction of said high and low speed is reversed, substantially as described.

2. In a shaper, the combination of a plunger, actuating mechanism for reciprocating said plunger, a tool-holder supported by said plunger and adapted to rotate thereon, and a shaft extending lengthwise through said plunger and adapted to impart a rotating feed to said tool-holder on said plunger, substantially as described.

3. In a shaper, the combination of a plunger, mechanism for reciprocating said plunger, a shaft mounted in said plunger and extending lengthwise through the same, face-plate R, mounted on said plunger, tool-head R^3, mounted on the end of said shaft and adapted to be rotated thereby, lugs R^2, attached to said head and embracing said face-plate, tool-head H, adjustably mounted in said head, and feeding mechanism for rotating said shaft, substantially as described.

4. In a shaper, the combination of a plunger, mechanism for reciprocating said plunger with a slow motion in one direction and a quick return in the opposite direction, tool-holder H, mounted on the plunger and adapted to a drawing cut, means for changing the motion of the main driving-pulley, whereby the relative direction of said high and low speed is reversed, vertical bed-plate B', and work-supporting table B, having vertical and horizontal adjustment on the face-plate B', whereby the strain on said table due to the drawing cut of the tool is in the direction of the bed-plate, substantially as described.

5. In a shaper, the combination of a work-table having two independent feeds, one horizontal and one vertical, and a tool-holder having a rotatable feed on the plunger, with means for operating two or more of said independent feeds simultaneously, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

MATTHEW MORTON.

Witnesses:

CHARLES H. FISK,

MARION A. REEVE.