(No Model.) 5 Sheets—Sheet 1.

J. ANGUS.

TOOL OSCILLATING DEVICE FOR PLANING MACHINES.

No. 298,269. Patented May 6, 1884.

Fig. 1.

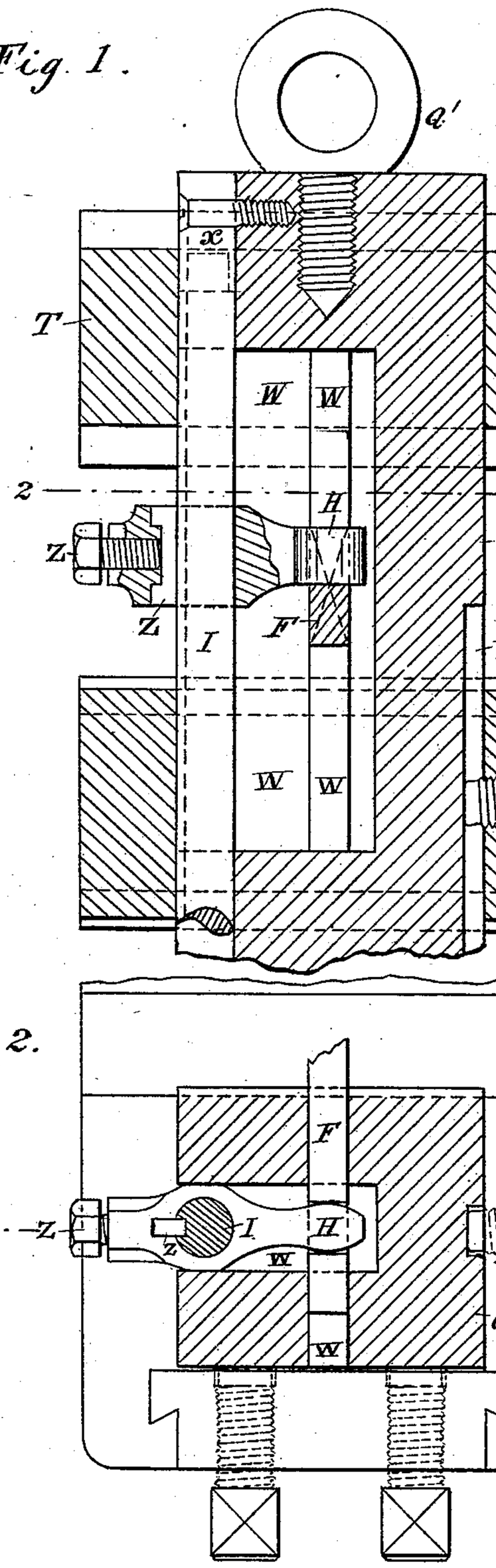


Fig. 3.

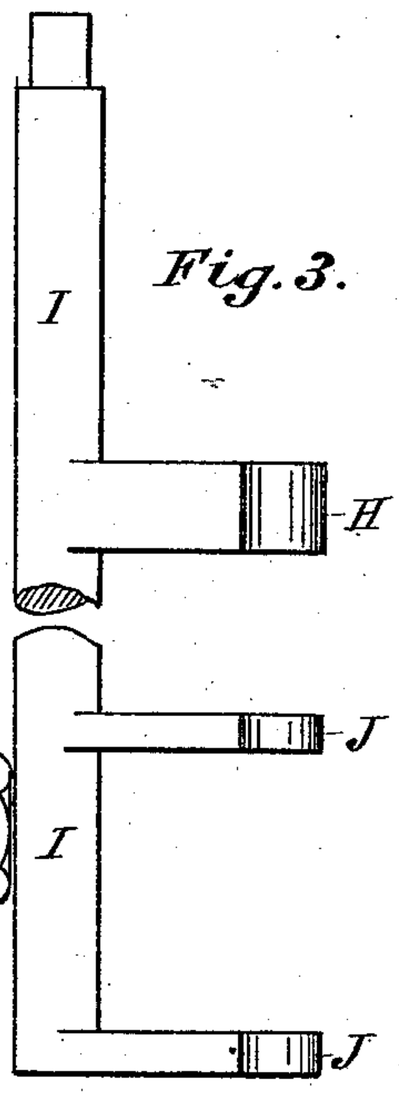


Fig. 2.

Inventor.

Attest:

Wes. Bowlow.

E. B. Bolton

Joseph Angus,

By his Attorneys,

Burke, Bacon & Bonnell

(No Model.) 5 Sheets—Sheet 2.

J. ANGUS.

TOOL OSCILLATING DEVICE FOR PLANING MACHINES.

No. 298,269. Patented May 6, 1884.

Fig. 4.

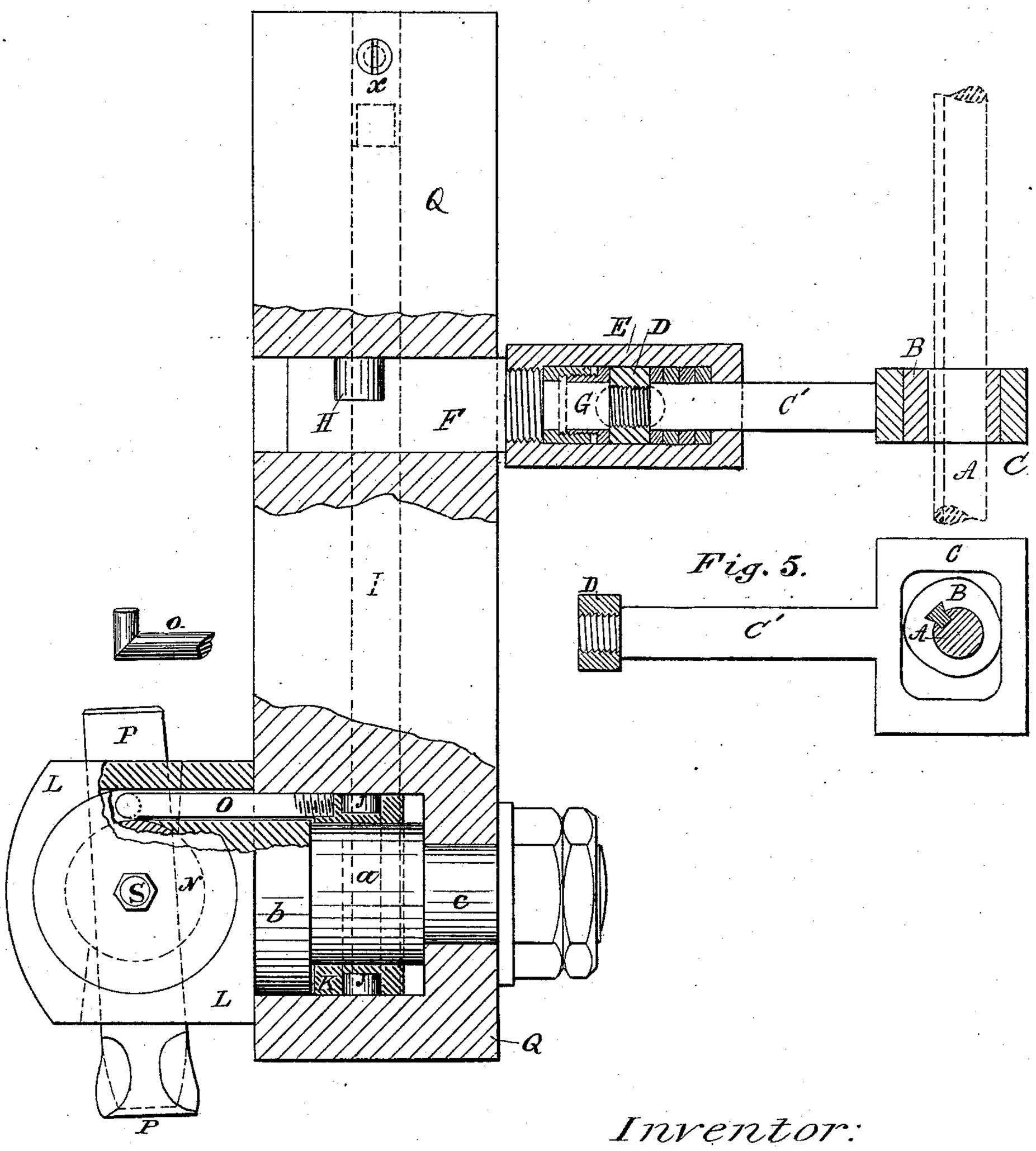


Fig. 5.

Inventor:

Joseph Angus,
by his Attys.
Burke, Fraser & Connett

Attest:

E. B. Bolton

Geo. Bainton

(No Model.)

5 Sheets—Sheet 3.

J. ANGUS.

TOOL OSCILLATING DEVICE FOR PLANING MACHINES.

No. 298,269. Patented May 6, 1884.

Fig. 6.

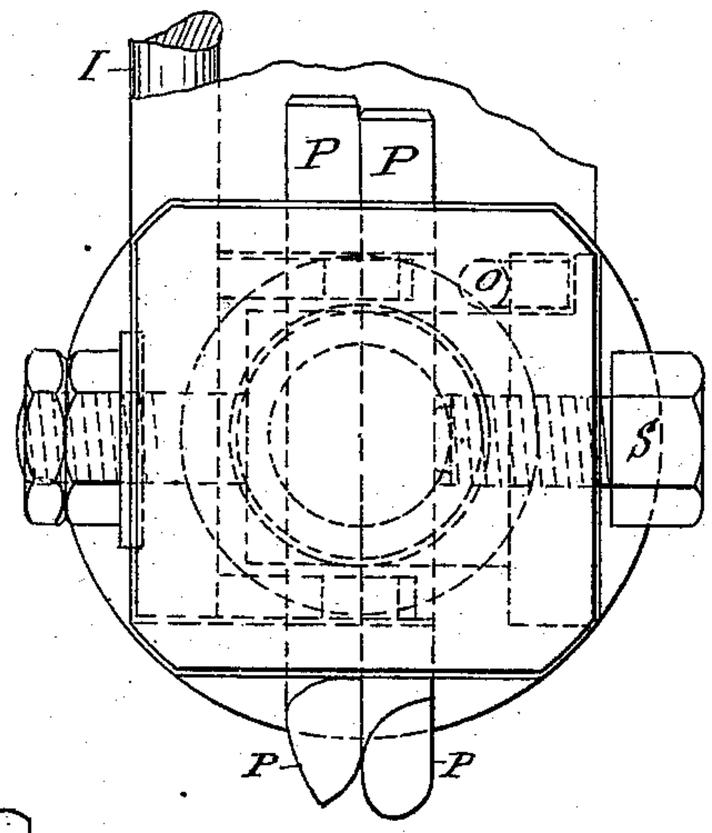


Fig. 7.

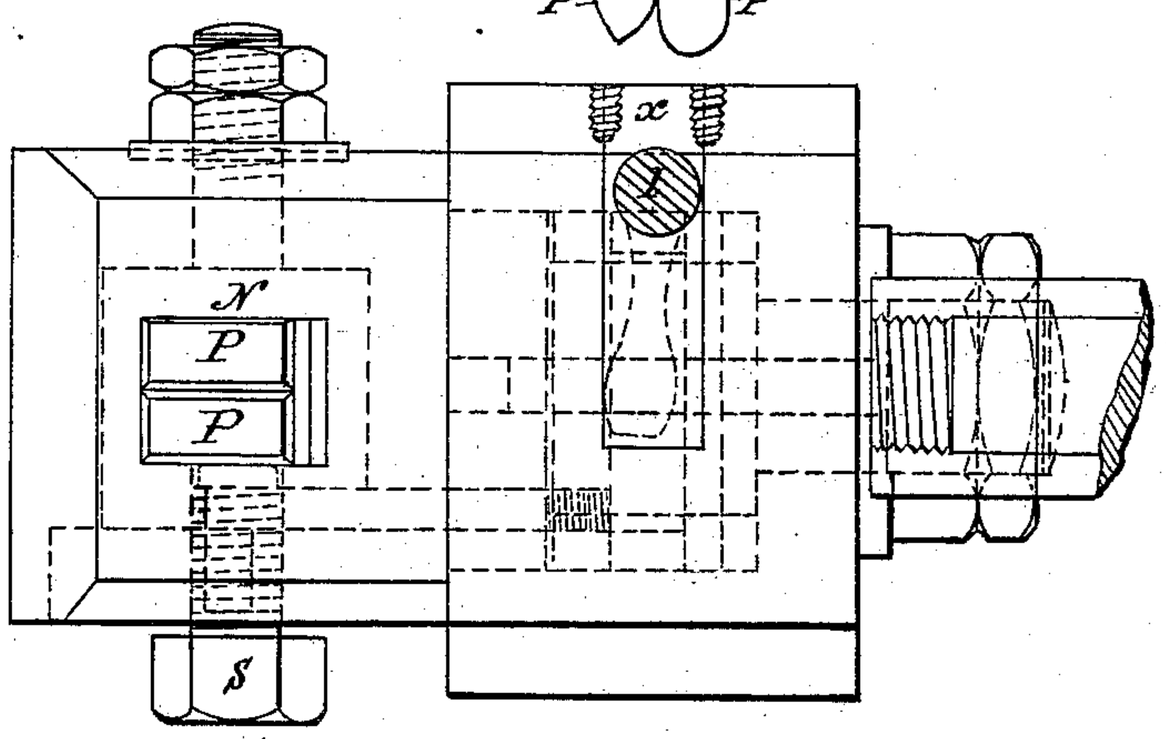
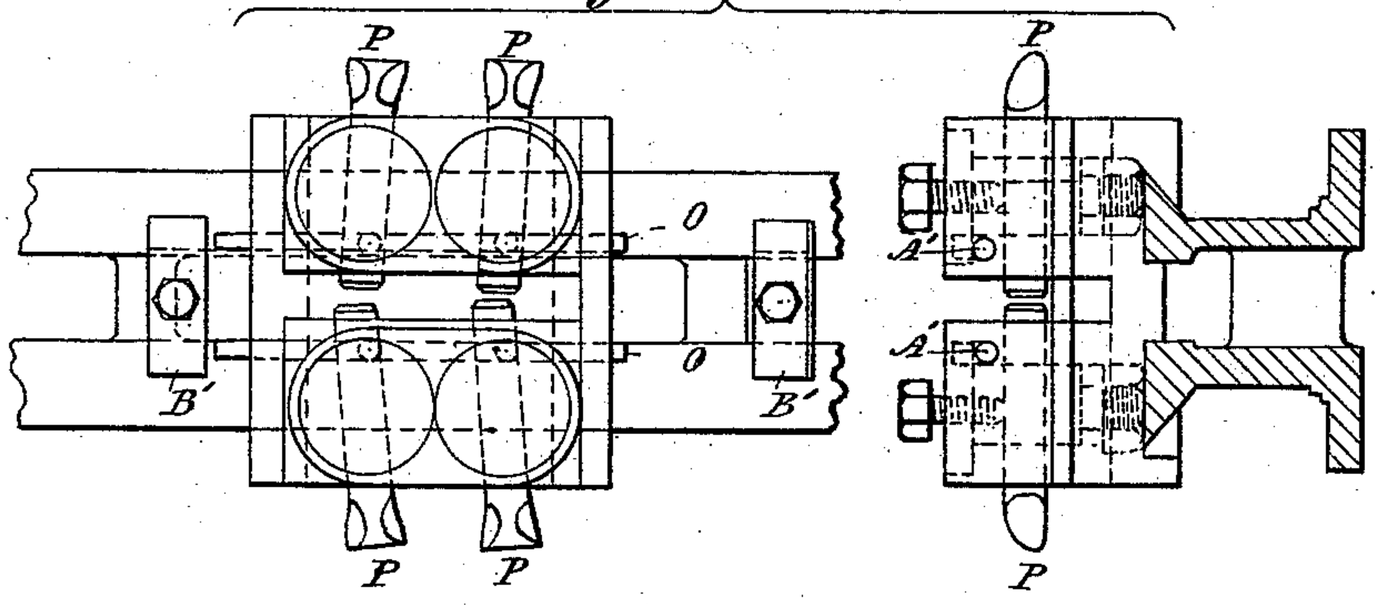


Fig. 8.



Attest:
E. B. Bolton
Geo. Bainton

Inventor:
Joseph Angus.
by his Attys.
Burke Fraser & Connett

(No Model.)

5 Sheets—Sheet 4.

J. ANGUS.

TOOL OSCILLATING DEVICE FOR PLANING MACHINES.

No. 298,269. Patented May 6, 1884.

Fig. 9.

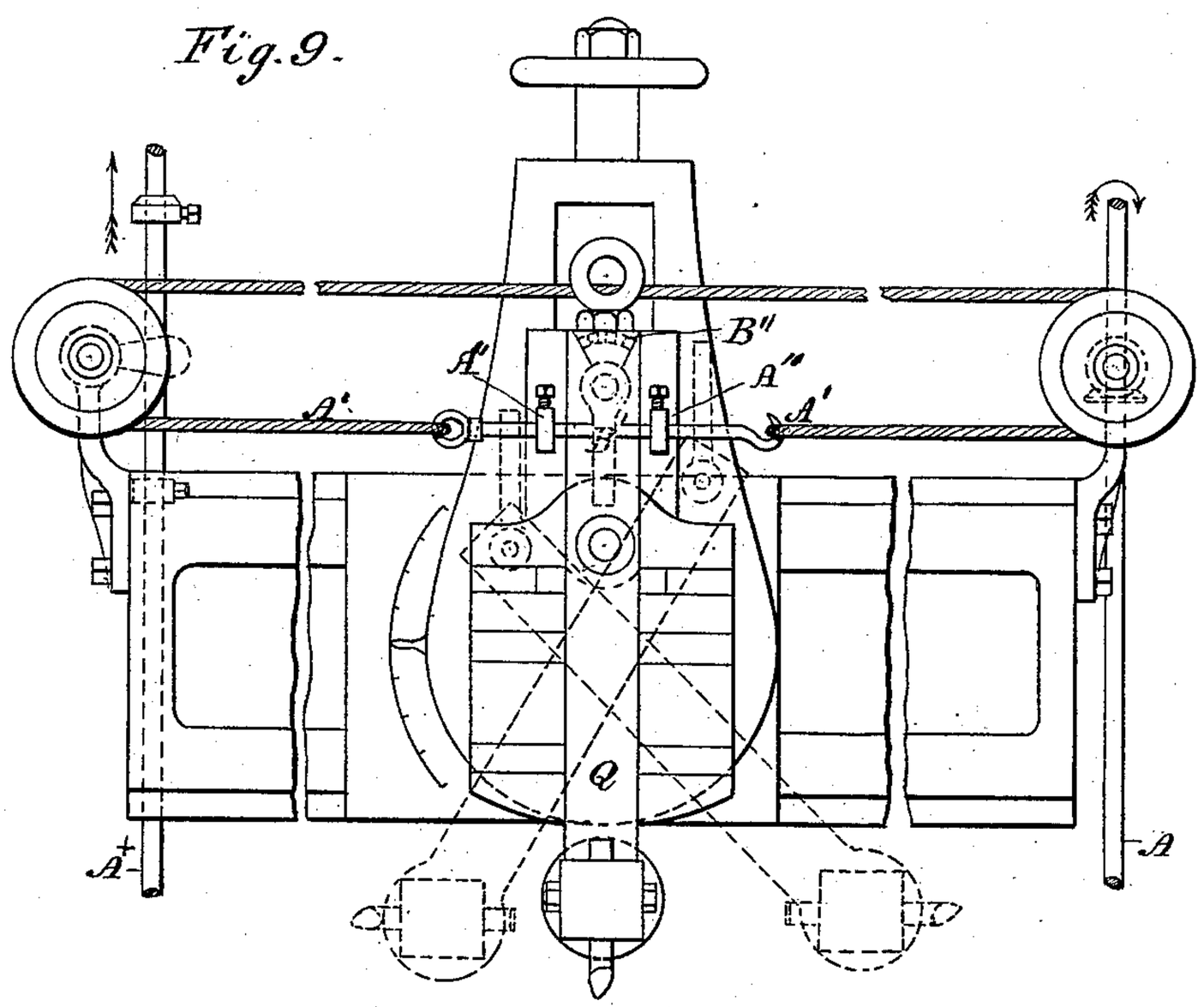
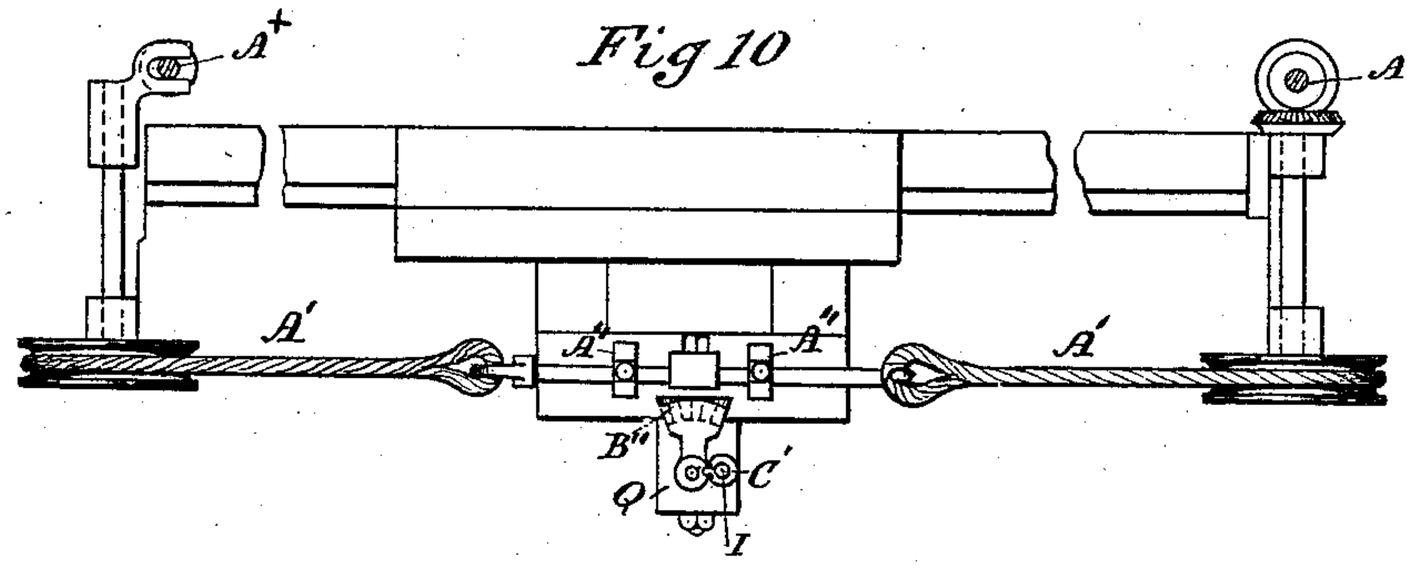


Fig 10



Inventor:

Attest:

E. B. Bolton

Geo. Bainton

Joseph Angus.

by his Attorneys.

Burke, Fraser & Connett

(No Model.) 5 Sheets—Sheet 5.

J. ANGUS.

TOOL OSCILLATING DEVICE FOR PLANING MACHINES.

No. 298,269. Patented May 6, 1884.

Fig. 11

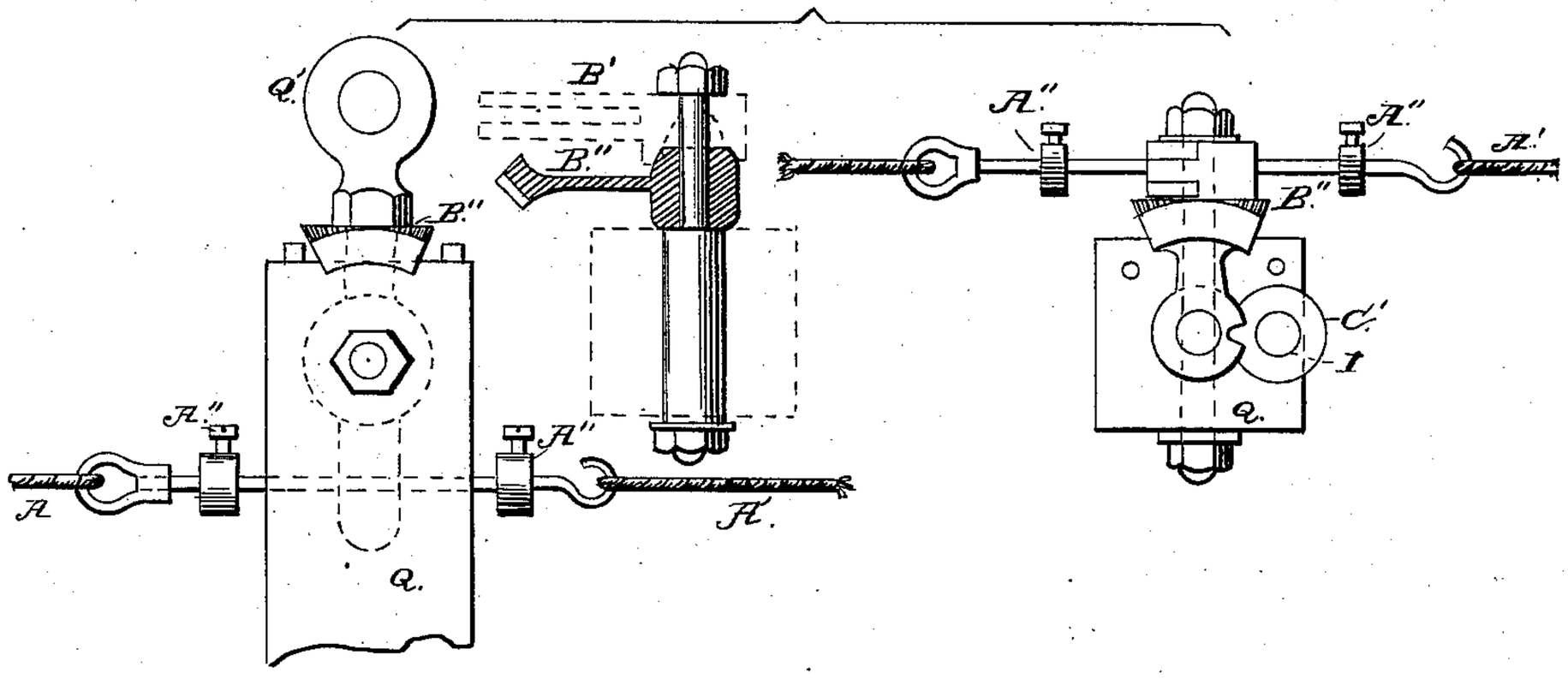
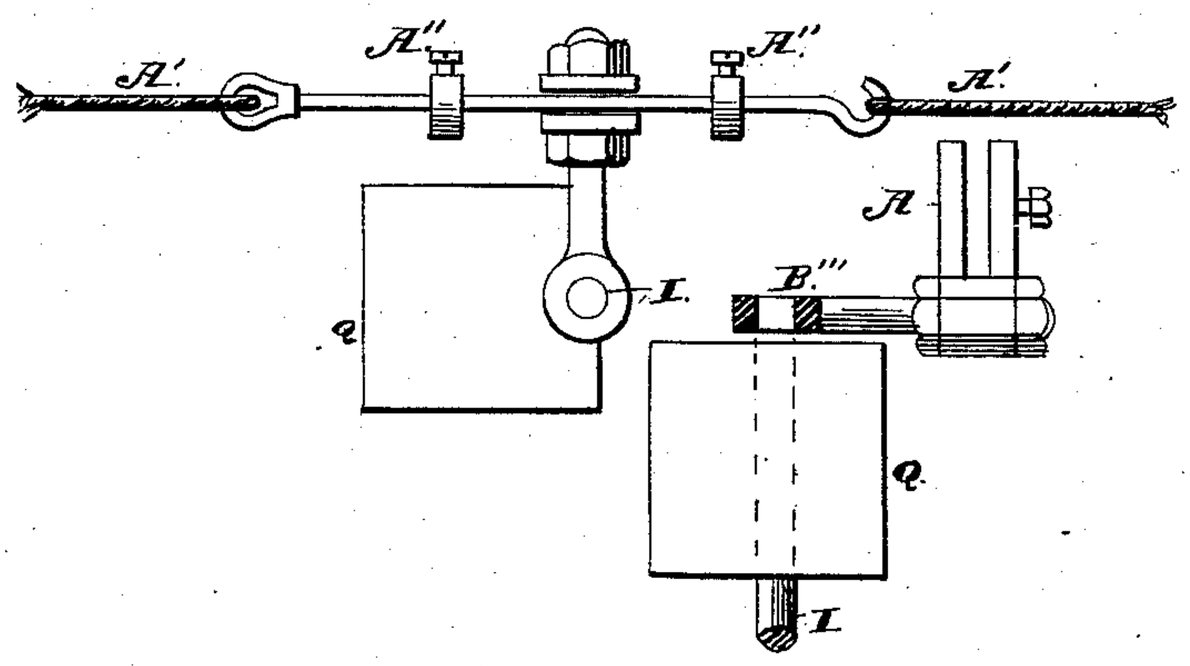


Fig. 12.



WITNESSES

St. A. Clark

P. T. Teagle

INVENTOR

Joseph Angus,

By his attorneys,

Burke Fraser & Comstock

UNITED STATES PATENT OFFICE.

JOSEPH ANGUS, OF SOUTH LAMBETH, COUNTY OF SURREY, ENGLAND.

TOOL-OSCILLATING DEVICE FOR PLANING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 298,269, dated May 6, 1884.

Application filed November 26, 1880. (No model.) Patented in England March 13, 1880, No. 1,091.

To all whom it may concern:

Be it known that I, JOSEPH ANGUS, a subject of the Queen of Great Britain, residing at South Lambeth, in the county of Surrey, England, have invented certain Improvements in Tool-Holders for Metal-Planing Machines and in Mechanism for Operating Same, of which the following is a specification.

My invention is designed to facilitate the reduction of metals by the employment of cutting-tools arranged to cut in both directions—on the back-stroke as well as the forward stroke.

The invention consists partly in a tool having two cutting-edges—one to cut on the forward and one on the back stroke—partly in the tool-holder, where the tool is arranged to cut both ways, and partly in the mechanism for shifting the tool and its holder.

In the drawings, which serve to illustrate my invention, Figure 1 is a fragmentary vertical section of the tool-bar of a planer on the line 1 1 of Fig. 2. Fig. 2 is a horizontal section of the tool-bar on the line 2 2 in Fig. 1. Fig. 3 is a detached view of the operating rod or shaft. Fig. 4 is a sectional elevation of the tool bar and holder of a planing-machine detached, showing the mechanism for actuating the tool-holder. Fig. 5 is a detached plan view of an operating-rod and cam shown in Fig. 4. Fig. 6 is a fragmentary front elevation of the tool-holder, and Fig. 7 is a plan of the same. Fig. 8 is a plan and transverse section showing the adaptation of my improvements to a planing-machine wherein the tool moves over the work. Figs. 9, 10, 11, 12 are detached views illustrating modified constructions of the mechanism for reversing the tool-holder.

Referring to Figs. 1 to 7, inclusive, Q is the tool-bar, fixed to the frame of the machine in the usual way, and L is a socket-piece, mounted so as to be adjustable on its axis in a bore or recess at the lower end of the same, being provided with a cylindrical shank, *a*, flange or shoulder *b*, tail-pin *c*, and ordinary nut, lock-nut, and washer, as shown. In the said socket-piece L is mounted, so as to rock on its axis, a tool-holder, N, the axis of which crosses the axis of the socket-piece at right angles. This holder is provided with a shank, tail-pin, washer, and nuts, substantially the same as those of the socket-piece.

P is the tool, the shank of which fits snugly in a transverse aperture in the holder N, wherein it is retained by means of a set-screw, S. The projecting ends of the tool P move in slots in the socket-piece L, the sides of which slots limit the rocking of the tool to the extent required. When the tool is cutting, it bears against the socket-piece L on both sides of the holder N, as shown by dotted lines in Fig. 4, and thus the strain produced by the cutting is removed from the holder, which greatly enhances its durability, the permanence of its adjustment, and the accuracy of the work produced. When the tool has cut across the work and reached the end of its forward stroke, the tool-holder N is rocked and the tool thereby reversed, ready to cut the metal on the return-stroke, and then the tool-holder is again rocked and the tool reversed in the same manner as before, whereby the cutting is effected in both directions instead of one direction only, as in ordinary machines, thus doing double the work of an ordinary machine.

The mechanism for automatically reversing the tool at the end of its stroke may be constructed in several ways, being varied slightly according to the style of planer; but the preferred form is best shown in Figs. 1 to 7, and that I will now describe.

On the shank *a* of the socket-piece L is mounted a sliding collar, K, which has a limited play endwise on said shank; and to this collar is fixed a hook-rod, O, the hooked end of which is arranged to engage a recess in a flange on the tool-holder N. By means of this rod O, the sliding of the collar K back and forth rocks the tool-holder and reverses the tool. The collar K is provided with a circumferential groove, and in this groove rest arms J J, which branch laterally from a vertically-arranged operating-rod, I, (see Fig. 3,) mounted so that it may be rocked on its axis in a groove in the tool-bar Q, its upper end being retained in place by means of a bearing-block, *x*. Oscillation of the rod I on its axis reciprocates the sliding collar K, and this movement is not in any way affected by the turning of the socket-piece L in its bearings, as the arms J engage the circumferential

groove in whatever position the collar may be placed by adjustment of the socket on its axis.

The cylindrical plug or buffer in use in an ordinary planing-machine, which forms a part of the tool-relieving gear, and ordinary single-acting cam and spindle for lifting the ordinary tool during the ordinary back-stroke, are removed, and their place in the center of the machine-slide is supplied by a specially-designed double-acting cam, B, Figs. 4 and 5, which is fitted with a feathered key, so as to slide vertically on the usual relief-spindle, A, and a strap or wiper-box, C, the stem C′ of which passes through the aperture in the machine-saddle previously occupied by the plug or buffer before mentioned, and enters a cylindrical box or cylinder, E, within which the said stem terminates in a screw, on which is fitted a collar, D, within the said cylinder E, which plays in a hole in the cast-iron strap-block of the machine-slide head to which the ordinary tool is usually secured, and into the forward end of the said cylinder E is screwed a slide-piece, F.

To secure a yielding connection between the stem C′ and the sliding piece F, and to provide means for adjusting the parts so that the cam B may properly rock the tool-holder, the space within the cylinder E behind and in front of the collar D may be taken up with spiral springs, adjusting-screws, or by leather packing G, as shown in Fig. 4. By this means breakage of the hook-rod O is prevented, and the tool-bar Q is thus enabled to be adjusted to any angle in a vertical plane. The slide F reciprocates in a slot, W, in the tool-bar, and has a notch or recess in its upper edge to engage an arm, H, on the operating-rod I.

The operation of the parts described is as follows: In the ordinary operation of the machine, when the planer-bed has reached the end of its stroke or movement, it strikes a tappet, which turns the relief-spindle A about a quarter of a revolution. By this movement of the existing spindle in such a machine, one point of the double cam B, turning with it, moves the slide F through the connecting-parts C, C′, D, and E. The movement of the slide F acts through the arm H, operating-rod I, arms J J, collar K, and hook-rod O, to oscillate the tool-holder N and reverse the tool for the next cut. As the bed moves to the other end of its stroke, the tool is again reversed by the opposite point of the cam B, thus enabling the double-cutting tool to cut on the return as well as on the forward stroke.

The peculiar advantages of my construction above described are that the tool-bar Q and its appendages may be turned completely around in a vertical plane on the collar D as a center, and be placed to work at any angle desired with the bed of the machine, while the wiper-box C maintains its proper horizontal position, as shown. The socket for the tool-holder N may also be turned on its axis and secured at any desired angle in relation to the tool-bar Q, thus enabling the tool to cut in any position. I provide also for raising and lowering the tool-bar Q, independent of the machine-slide to which it is attached, by making the arm H adjustable on the rod I, as in Figs. 1 and 2, and providing it with a gib and set-screw, Z, the former arranged to engage a keyway cut in the rod I. In Fig. 3 it is shown as fixed to the rod. The slots W W, which are cut in the bar at right angles to each other, are also elongated vertically, to allow of the vertical movement of the tool-bar Q without disturbing the reciprocating slide F. The tool-bar Q is during its adjustment temporarily supported by means of a set-screw, U, which passes through one of the fixing-straps T T, which form parts of the machine-slide head, and to which the tool-bar is ordinarily affixed, the end of the said set-screw engaging a groove, V, in the bar. This groove is made a little shorter than the slots W, so as to prevent the slide F and arm H from being damaged by the weight of the tool-bar while it is being adjusted and fixed by the main gripping adjusting-screws of the straps T T. The tool-bar Q may be raised or lowered by means of a sling-chain arranged to hook into a ring, Q′, in the top of said bar. In lieu of an adjustable arm, H, several arms may be fixed to the rod I at intervals, and each be arranged to engage the slide F, as desired, so as to adjust the bar to different heights without the use of the long slots W W, hereinbefore described. By cutting the slot W (in which the arm H plays) quite through the bar from front to back, the whole attachment may be reversed, so that the tool may work either in front or behind the bar.

Fig. 8 shows an arrangement of my invention designed for planing-machines in which the work remains fixed and the tools move over it, the tools being carried on the saddle of such a machine, which saddle is actuated by the main driving-screw of the machine or other similar ordinary means. In this construction the tools are reversed by means of tappet-rods O O, the projecting gibs on which engage the rocking tool-holders, and at the termination of each stroke the ends of the tappet-rods strike one or the other of the adjustable stops B′, mounted on the machine-bed. It will be seen that in these figures I have shown the perfect feasibility of employing and operating several double-cutting tools arranged in the same cutting plane, and in different cutting planes.

Figs. 9 and 10 illustrate, in elevation and plan, the adaptation of my improved double-cutting tool to machines which have not the usual tool-relieving mechanism, and in which it is not convenient to actuate the tool-reversing mechanism through the medium of the machine-saddle, as above described. In this case I transmit the motion from an existing machine feeding-spindle, A, (or other equivalent part,) to the tool-holder either through bevel-wheels shown as driven by the right-hand rotary rock-spindle marked A in Figs. 9 and

10, or by means of a lever and tappets shown as operated by the left-hand vertically-reciprocating feed-spindle marked A× in the same figures. By this means an endless cord, A′, like the ordinary feeding-cord on some planing-machines, is given a reciprocating movement. I provide this endless cord with tappets A″ A″, suitably attached to a rod connecting the ends of the said cord, and these tappets actuate an adjustable lever, B′, and two quadrants, B″, which impart motion, through the lever or disk C′, to the operating-rod I, and through it, as before described, to the tool-holder. Fig. 11 shows details of this mechanism.

In Fig. 12, instead of the quadrants B″ and disk C′ above referred to, is employed an arm, B‴, directly connecting the tappet-lever B′ with the actuating-rod I.

The modifications illustrated in Figs. 8 to 12, inclusive, are not herein claimed, and may form subject-matter for a separate application.

I claim as my invention—

1. The combination of a double-cutting tool, a rocking tool-holder, and a tool-holder socket, the socket being adjustable in a vertical plane on a horizontal axis, and the tool-holder and tool rocking in the socket on an axis at right angles to the axis of the socket, whereby the tool may be set to cut the work at any angle.

2. The combination of a tool-bar, a tool-holder socket mounted in the tool-bar and adjustable therein to any position on its axis, a tool-holder rocking on its axis in the socket, a double-cutting tool mounted in the tool-holder and rocking therewith, and the means, substantially as herein described, for automatically rocking the tool-holder and reversing the tool, for the purpose herein specified.

3. The combination of a tool-bar adjustable in a vertical plane on a horizontal axis, a tool-holder socket adjustable on its axis in the tool-bar, a tool-holder rocking on its axis in the socket, and a double-cutting tool mounted in the tool-holder, for the purpose herein specified.

4. The combination of a tool-bar adjustable in a vertical plane on a horizontal axis, and longitudinally in the same plane, a tool-holder socket adjustable on its axis in the tool-bar, a tool-holder rocking on its axis in the socket, a double-cutting tool mounted in the tool-holder and rocking therewith, and the means, substantially as herein described, for automatically rocking the tool-holder and reversing the tool irrespective of the adjustments of the tool-bar and tool-holder socket.

5. The combination, with the tool-bar Q, of the socket-piece L, mounted rotatively therein, the tool-holder N, rocking in the socket-piece, the axis of the two crossing at right angles, the tool P, arranged to fit a transverse aperture in the tool-holder, and its ends to play in circumscribed slots or openings in the socket-pieces, the hook-rod O, collar K, operating-rod I, provided with arms J J H, and the slide F, arranged to be automatically reciprocated, substantially as set forth.

6. The combination, with the tool-bar Q, of the socket-piece adjustable on its axis, the tool-holder N, rocking in said socket-piece, the hook-rod O, sliding collar K, operating-rod I, slide F, relief-spindle A, cam B, strap C, and stem C′, connected with the slide F by means of a yielding coupling, substantially as and for the purposes set forth.

JOSEPH ANGUS.

Witnesses:

WILLIAM HENDERSON,
HENRY SMITH,
ROBERT MAJOR BAILY.