

(No Model.)

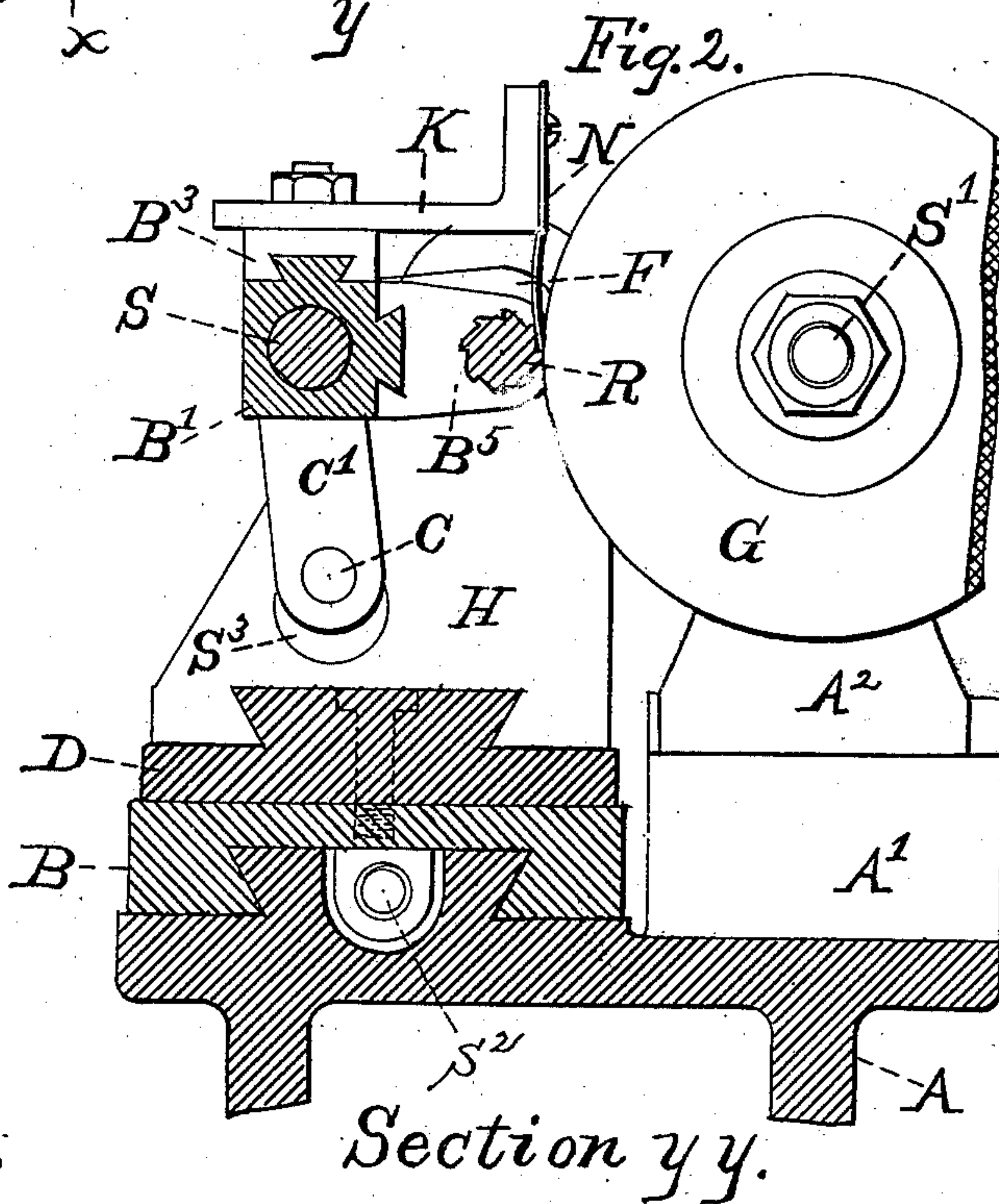
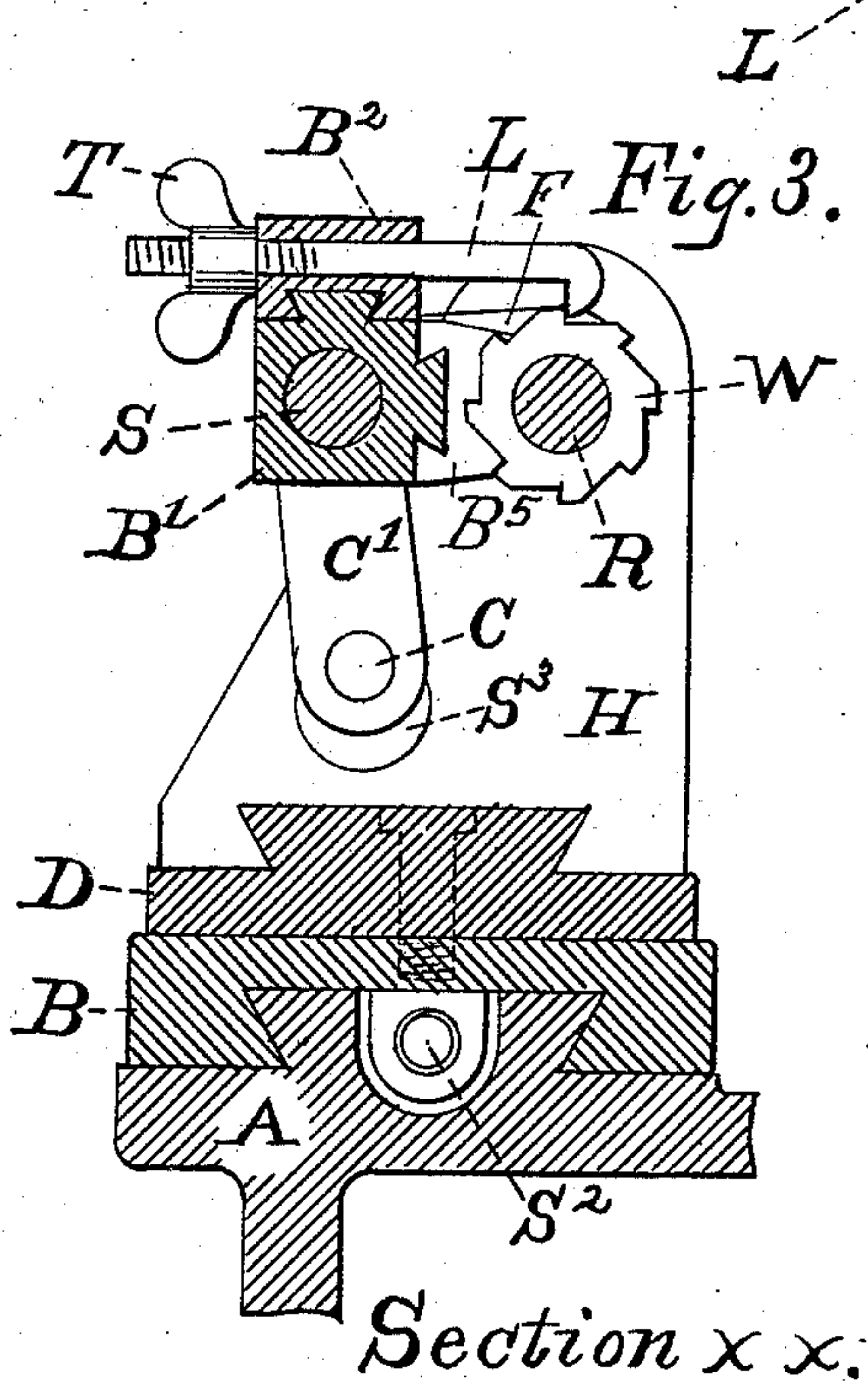
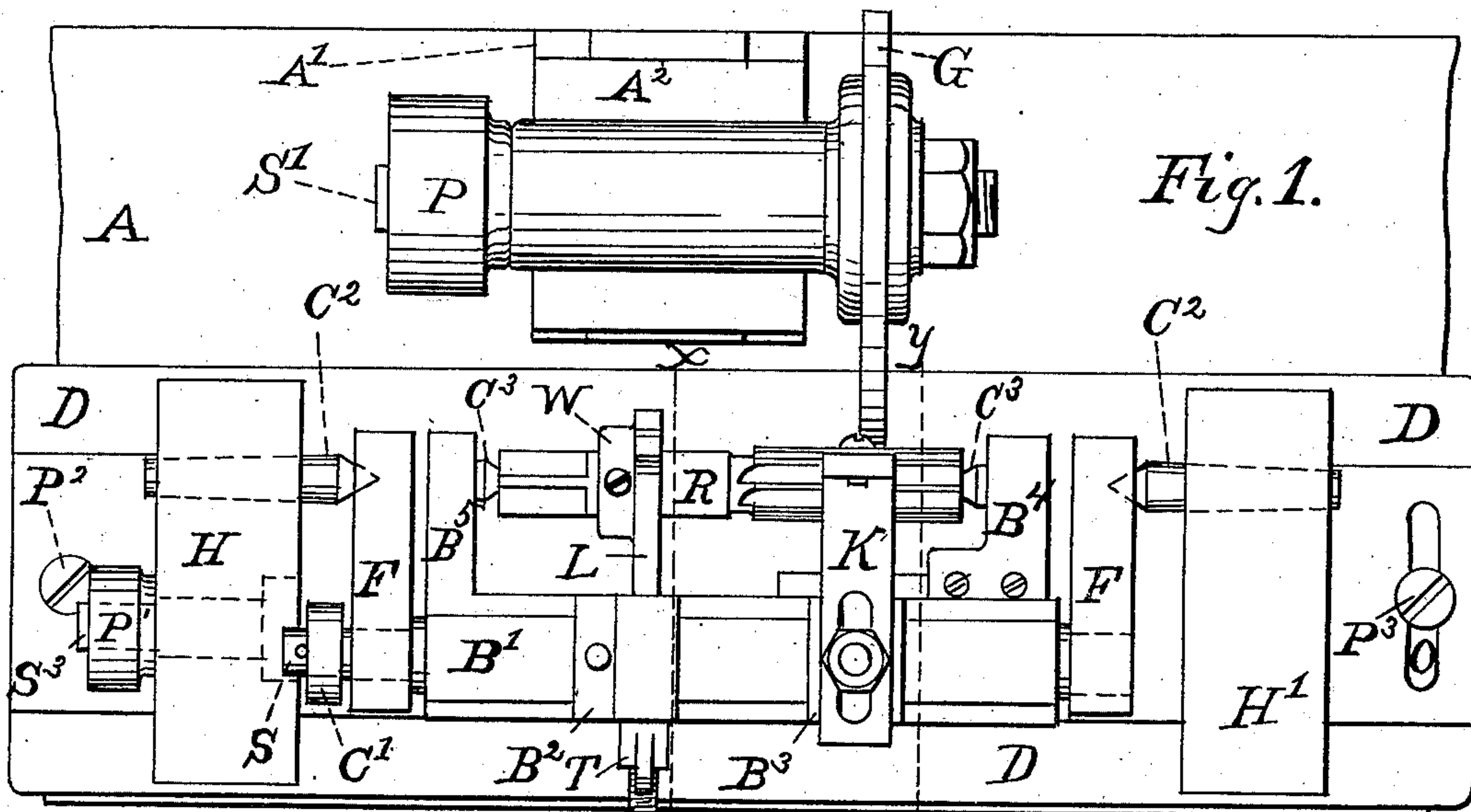
3 Sheets—Sheet 1.

J. W. HEYER.

REAMER RELIEVING MACHINE.

No. 308,669.

Patented Dec. 2, 1884.



Witnesses;
C. O. Palmer
H. W. Faulkner

Inventor:
John Worth Hoyer,
By his Attorney,
F. H. Richards

(No Model.)

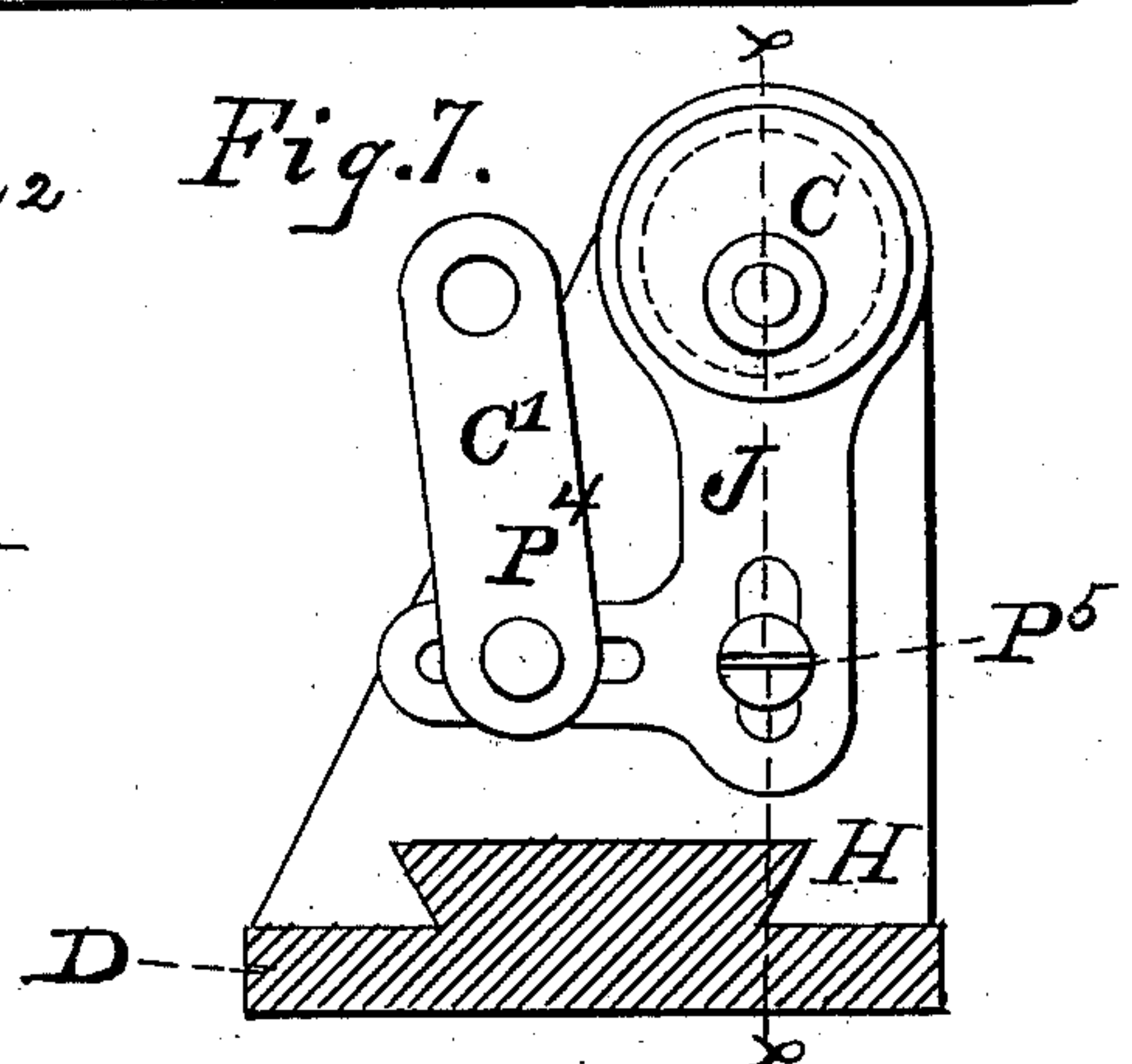
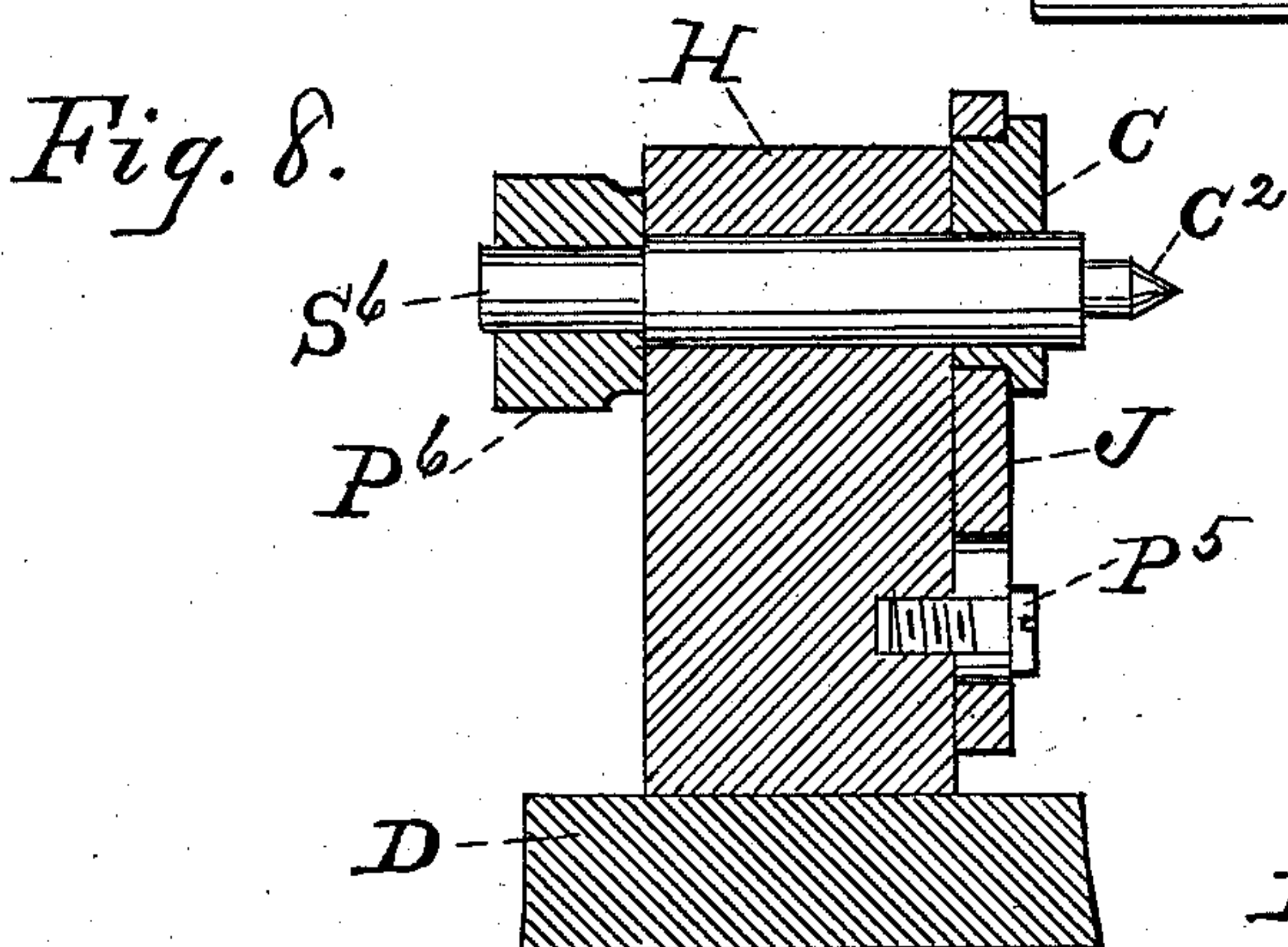
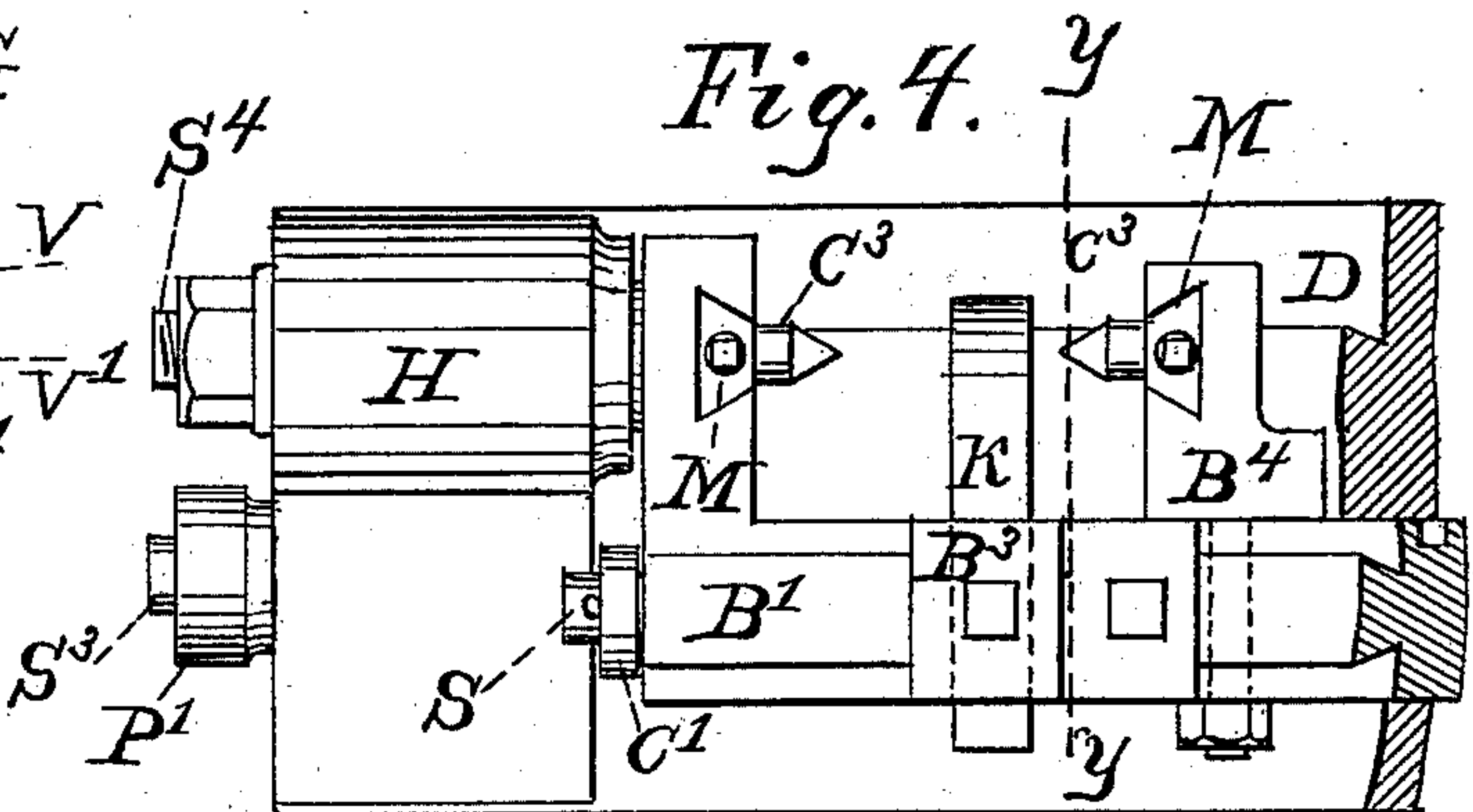
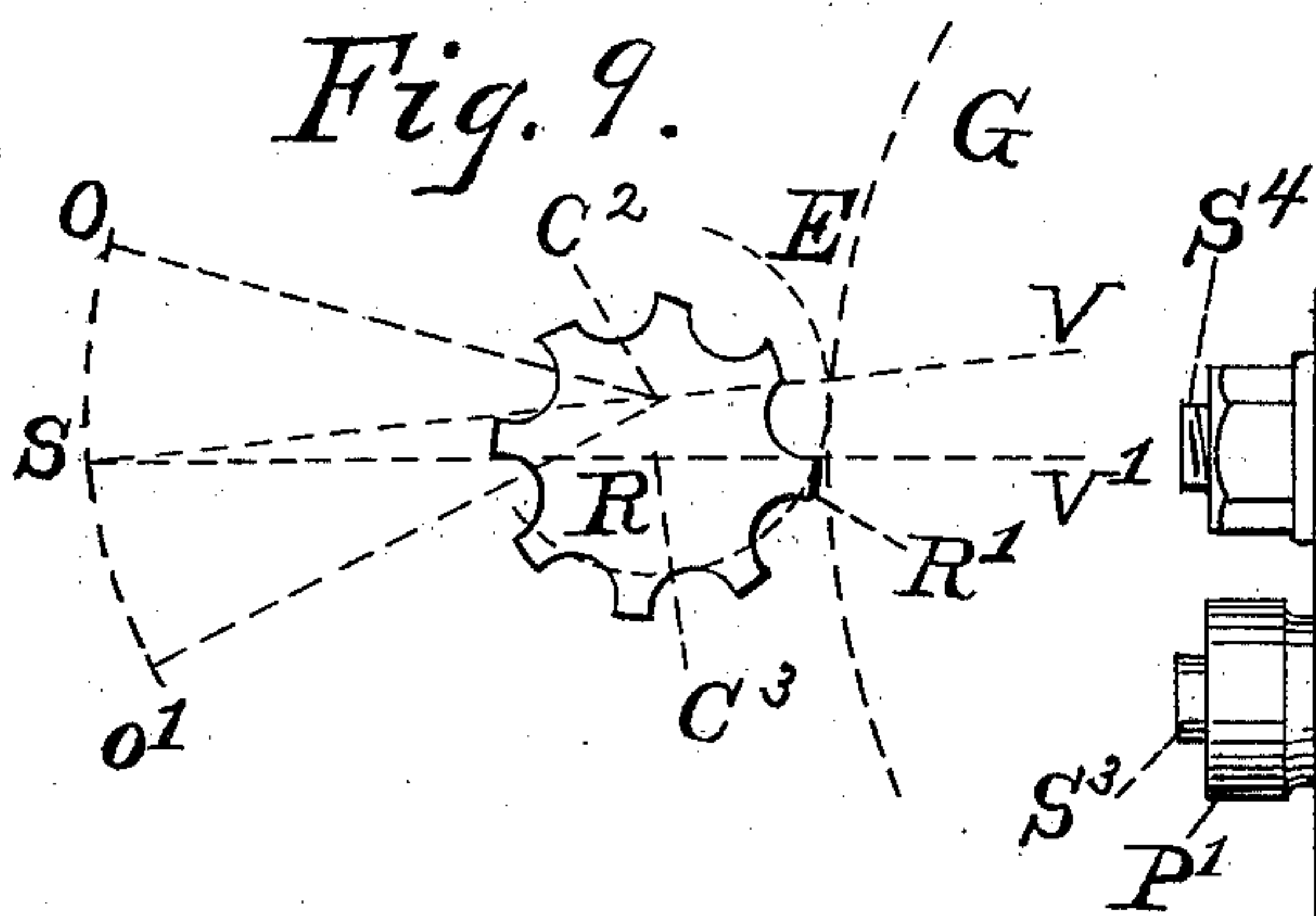
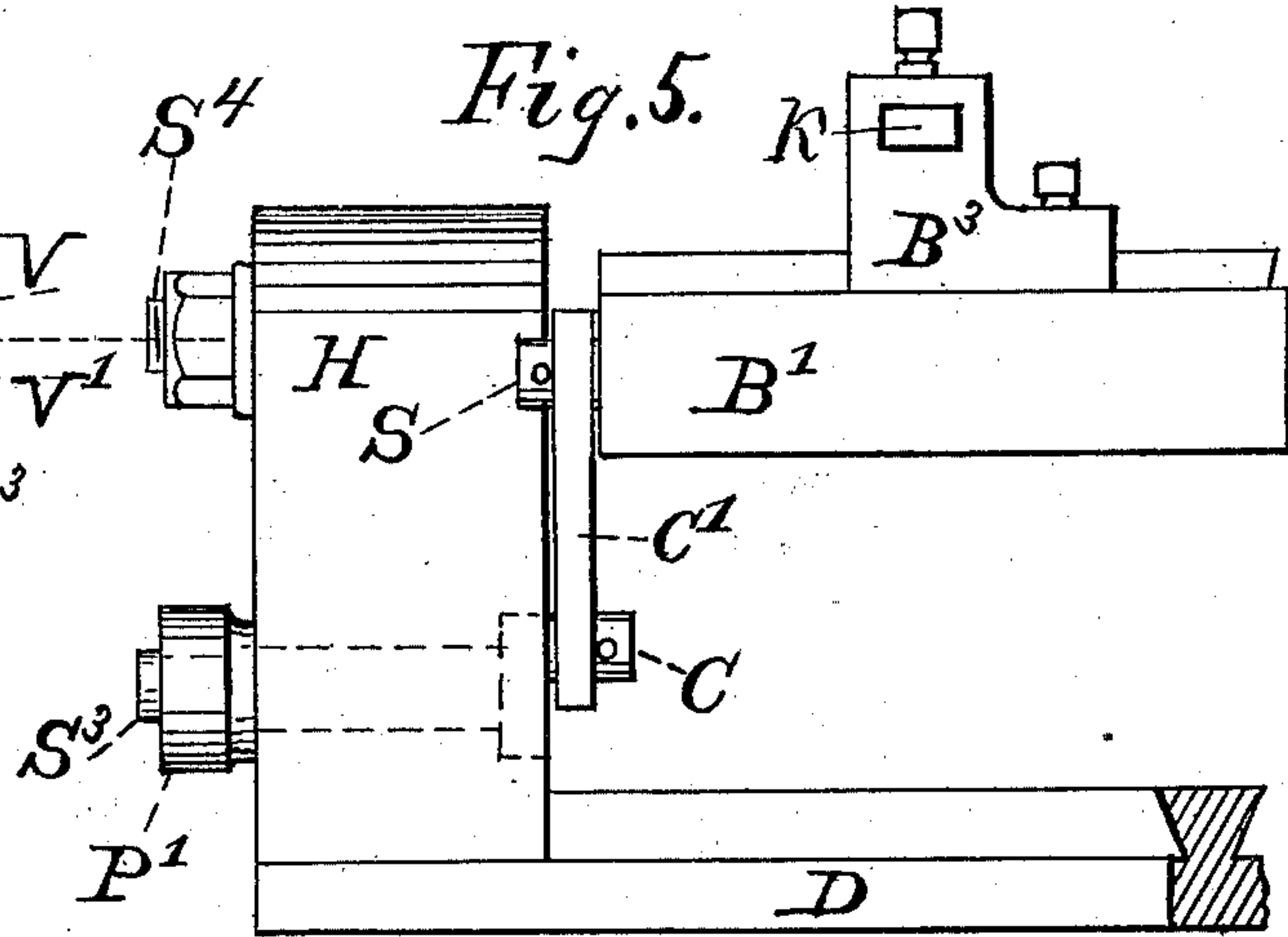
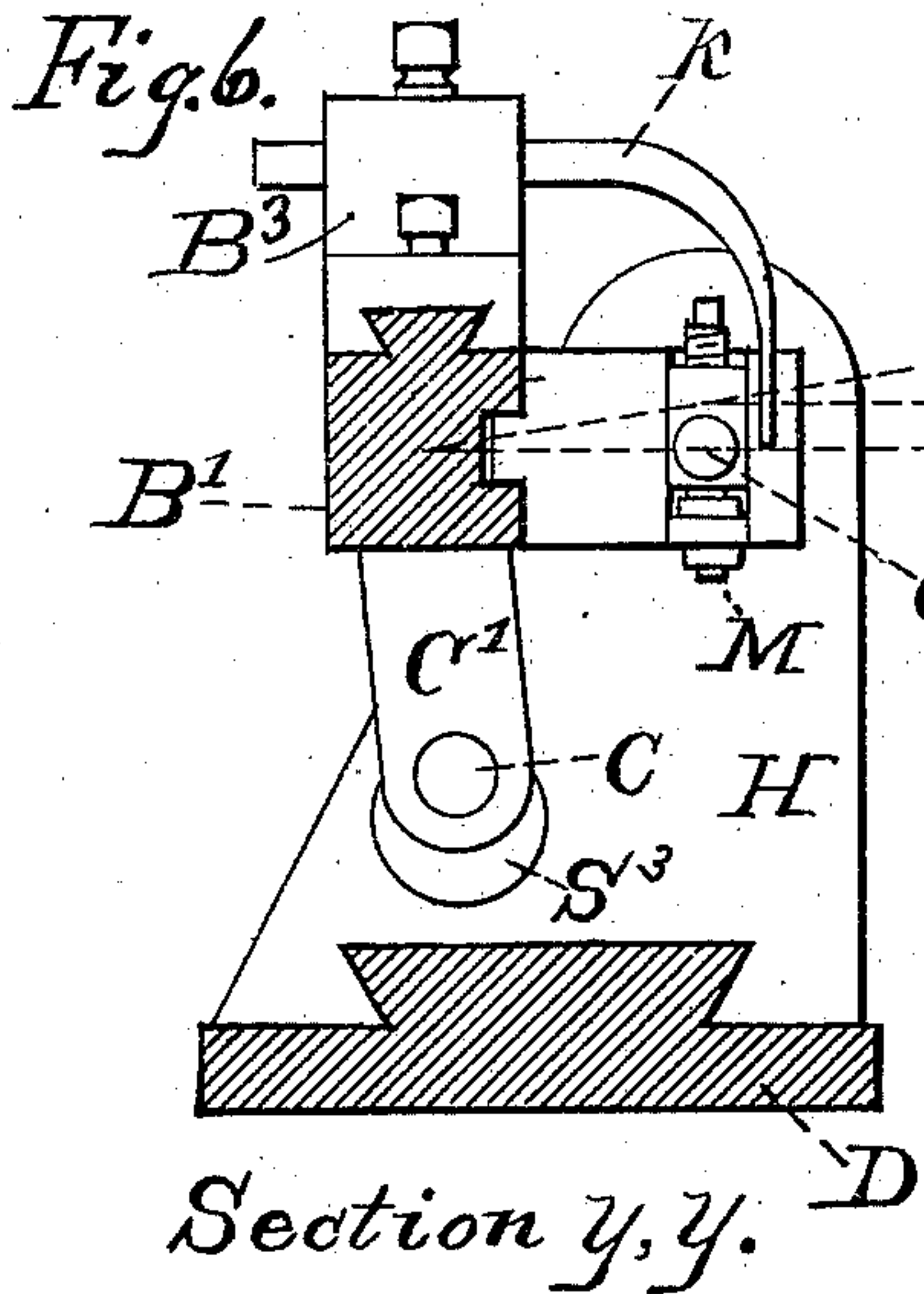
3 Sheets—Sheet 2.

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Witnesses; *Section x x*
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3 Sheets—Sheet 3.

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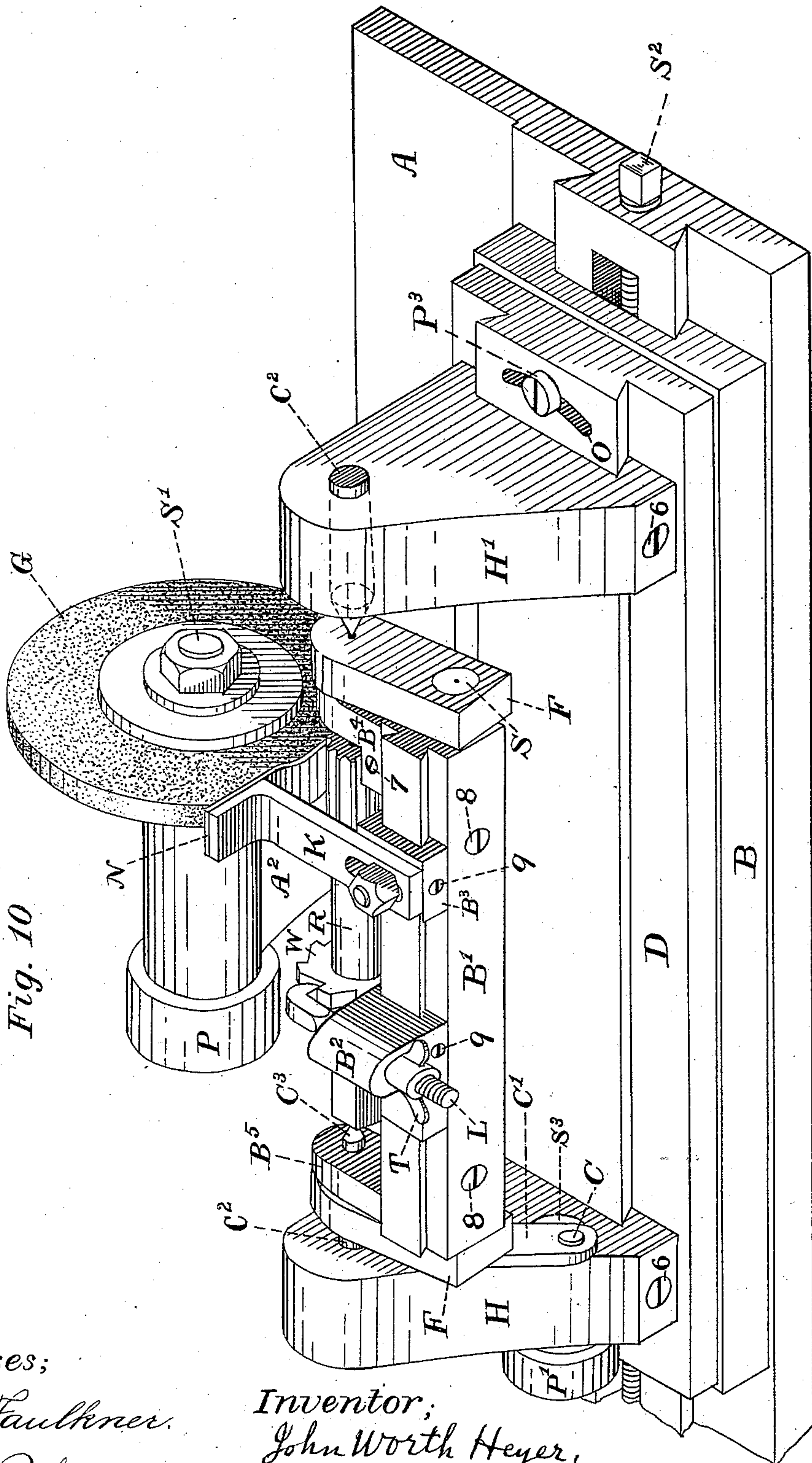


Fig. 10

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UNITED STATES PATENT OFFICE.

JOHN WORTH HEYER, OF HARTFORD, CONNECTICUT.

REAMER-RELIEVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 308,669, dated December 2, 1884.

Application filed January 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN WORTH HEYER, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Reamer-Relieving Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to machines for relieving the cutting-edges of reamers, or those of other similar tools, either before or after hardening, by means of any suitable cutting or grinding devices. It has for its object to furnish such a machine that shall be adapted to relieve the cutting-edges of a tool by reducing each "land," or surface between the grooves of the same, to an arc of a circle that is slightly eccentric to the circle of the cutting-edges by means of the ordinary disk-shaped emery or corundum wheels. For the attainment of that object it consists in an oscillating fixture adapted to carry the tool to be operated upon, and certain mechanism adapted to carry and operate that fixture and the grinding-wheel, the whole constituting my improved-reamer-relieving machine.

Referring to the drawings, Figure 1 is a plan view of a machine embodying my invention. Fig. 2 is a vertical transverse section in line Y Y, Fig. 1. Fig. 3 is a similar section in line X X, Fig. 1. Fig. 4 is a partial plan view showing a modification of the fixture for holding the tool. Fig. 5 is a front elevation of the same. Fig. 6 is a vertical transverse section in line Y Y, Fig. 4. Fig. 7 shows an alternative construction of part of the details of the operating mechanism. Fig. 8 is a vertical longitudinal section in line X X, Fig. 7. Fig. 9 is a diagram illustrating the form of relief given to the cutting-edges of a tool. Fig. 10 is a perspective view of the form of machine shown in Figs. 1, 2, and 3.

Similar letters refer to similar parts throughout the several views.

The mechanism of my improved relieving-machine I prefer to arrange upon a horizontal bed, as A, properly formed to receive it. A raised part, A', formed thereon or affixed thereto is adapted to receive any suitable ad-

justable spindle-carrying head, as A², which may be made to adjust by swinging or, preferably, by sliding, as shown in the present instance. That adjustable head may be adjusted by means of a screw and nut of the kind commonly used for such purposes. The spindle S', which is carried in the head A², has means for carrying the grinding-wheel G and a pulley, P, whereby it is driven. The raised part A' may be adjustably secured to the bed A, and the head A² may be formed of two parts, of which the upper one, carrying the spindle S', may be pivotally adjustably secured to the lower one. Those adjustments, which are already well known, I do not consider essential for the proper operation of the machine upon ordinary work; but they are sometimes convenient in special cases.

Upon the top of bed A, near the front thereof, suitable ways are formed for carrying a sliding table, as B, which is adapted to be moved longitudinally of them in either direction by means of a nut and the screw S², or by a rack-and-gear motion, or some equivalent means, which may be operated by hand-power or otherwise, as preferred. A laterally-adjustable auxiliary table, D, is pivotally secured to the top of table B by means of pivot-screw P² and binding-screw P³ or their equivalent means, and has suitable ways or equivalent means for securing thereto the two heads H and H'. These heads are each provided with any suitable center, as C², and are so constructed as to slide toward and from each other upon the ways of the auxiliary table D without disturbing the proper alignment of those centers, these heads, as shown herein, being secured to their way by set-screws 6. The center in one of those heads, preferably that in H', may be, and frequently is, made to slide therein by means of a dead spindle and screw similar to those used in the tail-stocks of ordinary engine-lathes, for the purpose of properly securing any arbor, tool, or fixture that is carried upon the centers.

The fixture for carrying the tool consists of two principal parts, each, as usually made, consisting of several pieces. The first part may be any suitable oscillating frame carried upon the centers C² or their equivalent, and

having means for oscillating it. The second part consists of two centers carried by parts that are adjustable relative to the axis of oscillation of the first principal part of the fixture.

5 As shown in Figs. 1, 2, and 3, this fixture consists of the following:

A shaft or other form of bar, S, has rigidly fixed thereto two arms, F, having recesses made therein to receive the centers C^2 , hereinbefore described. One end of that shaft, at the left-hand in Fig. 1, extends through the arm and carries one end, preferably the upper one, as shown, of the connecting-rod C' . A vertically-reciprocating motion is imparted to that connecting-rod by means of pulley P' , shaft S^3 , and crank C, or by some similar or equivalent device. This crank may be made adjustable, as shown, for instance, at D, in the drawing of United States Patent No. 150,107, dated April 21, 1874, to which reference may be had. A bar, B' , is pivotally secured to the shaft S, and has two arms or projections, as B^4 and B^5 , each provided with centers C^3 , for carrying the tool R. Any suitable binding-screws, as S, are provided to fix the bar B' to the shaft S in any desired position. One of those arms, preferably B^4 , is made adjustable longitudinally on that bar in any convenient manner, for the purpose of adapting the fixture to the holding of tools of various lengths. It may be held on said bar by a set-screw, 7. The bar B' is suitably formed to receive a slide, B^3 , that carries a stop consisting of the piece K and spring-piece N, for that cutting-edge of the tool R that is being relieved, as shown best in Fig. 2. For the purpose of keeping that cutting-edge firmly against that stop, a ratchet-collar, W, is fixed on the shank of the tool, and held in place by a hook-shaped tension-rod, L, having a thumb-nut, T, or equivalent means for tightening it, and carried in any suitable piece, as the slide B^2 .

The sliding pieces B^2 and B^3 , which are secured to B' by set-screws 9, are provided to facilitate the convenient adjustment of the stop and tension-rod longitudinally of the bar B' , and not because they are necessary, for both may be dispensed with, and that stop and rod secured directly to that bar by other suitable means—as, for instance, the common T-slot and bolt used for securing the shipping-dogs to metal-planing-machine tables, as shown in United States Patent No. 93,907, to which reference may be had. In constructing this fixture I prefer to make these several parts of such relative proportions that when the bar B' is swung to bring the center line of arm B^5 in the same plane as the center line of arm F the axis of the centers C^3 shall coincide with the axis of centers C^2 , the said axis being also parallel to the ways of auxiliary table D. This arrangement is illustrated in the diagram Fig. 9, in which S is the axis of shaft S, C^2 the axis of centers C^2 , C^3 the axis of centers C^3 , R an outline of the cross-section of a reamer be-

ing relieved, and E a circle concentric with the axis C^2 , the distance S C^2 being equal to the distance S C^3 . If, now, the bar B' is swung to the position above described, so the axes C^2 and C^3 coincide, it is obvious the circle E will be concentric to the axis C^3 of the reamer R, and that if that reamer be then oscillated upon that axis against the rapidly-revolving grinding-wheel G the land R' would be ground concentric thereto without any relief; but if the frame B' be so adjusted and fixed upon shaft S that those axes C^2 and C^3 do not coincide, but form instead an angle having its apex at axis S, as shown in the angle V S V', then, when the reamer is oscillated as before, the land R' will be ground to have a relief corresponding to the circle E, the cutting-edge of that land being on the line S V'. The three cutting-edges above the line S V are drawn having such a relief, while those below that line are drawn without any. The distance between the axes C^2 and C^3 must of course correspond to the amount of relief required to be given to the cutting-edges; but it may be a very small fraction of the diameter of the reamer, frequently not exceeding one one-thousandth part thereof, and sometimes very much less than that, and still give a sufficient amount of relief. The arc of oscillation of the fixture O O', Fig. 9, is determined by the stroke of crank C, which, therefore, is preferably made adjustable, and must be sufficient to properly present the whole width of the land R to the wheel G.

The operation of my invention is as follows: The tool to be operated upon is placed between the centers C^3 , which are adjusted to hold it securely. The stop K is properly adjusted to hold one of the cutting-edges of the tool, as R' in Fig. 9, in the required position relative to the grinding-wheel, and the pieces W, B^2 , L, and T set to hold that cutting-edge against that stop, as hereinbefore described. The fixture is adjusted to make the angle V S V' correspond to the amount of relief required, and the stroke of the crank C is adjusted to give the required angle of oscillation, as O C^2 O' in Fig. 9, and the auxiliary table adjusted to give the required taper to the tool. The shaft S^3 is now made to revolve by means of a band upon pulley P' , and the wheel G by means of a band upon pulley P, both at proper velocities determined by the size and nature of the machine and of the tool to be operated upon. The sliding head A^2 is then moved until the wheel G touches the land of the reamer, when the table B is moved to and fro to bring the whole length of that land to be relieved to the action of that wheel a sufficient number of times, the wheel in the meantime being gradually fed to the tool to produce the required amount of relief to that land, these operations being repeated until all of the cutting-edges are relieved.

I do not limit myself to the particular construction of the fixture hereinbefore described,

as it may be modified in a variety of ways and still retain its essential features. In Figs. 4, 5, and 6 I have illustrated one such modification of that fixture. In those views the centers C^2 are replaced by a shaft, S^4 , that carries the bar B' , which is rigidly fixed thereto. The centers C^3 are fixed in or formed upon an adjustable piece—as, for instance, slides that are adjustable by means of screws M . The stop K is shown of modified form; but the remaining details are substantially the same as in Figs. 1, 2, and 3. This form of fixture is not especially recommended, except it may be for use in the relieving of short tools.

The construction of the crank-motion for oscillating the fixture may also be modified in several ways without essentially altering its function in the machine. One such modification is shown in two views in Figs. 7 and 8, of which the former is a similar view to Fig. 3, and the latter a vertical section in line XX of the former view. By this mode of construction the center C^2 is made part of a spindle, S^6 , which is driven by pulley P^6 , and carries an eccentric, C , that is essentially an enlargement of the crank-pin C of the shaft S^3 in Fig. 6. That eccentric carries an eccentric-strap, J , that works over a stud, P^5 , and has another one, P^4 , for actuating the connecting-rod C' in the usual manner.

Having thus described my invention, I claim as new and desire to secure by Letters Patent of the United States—

1. In a relieving-machine, a fixture for hold-

ing a tool adapted to be oscillated about a fixed axis, and having centers adjustable relative to that axis, substantially as and for the purpose described.

2. In a relieving-machine, a fixture for holding a tool adapted to be oscillated about a fixed axis, and consisting of two parts, one adjustable upon the other, substantially as described.

3. In a relieving-machine, a fixture for holding a tool adapted to be oscillated about a fixed axis, and consisting of two parts, one adapted to swing upon the other, substantially as described.

4. In a relieving-machine, a fixture for holding a tool adapted to be oscillated about a fixed axis, and consisting of two parts, one adapted to swing upon the other, and having means, substantially as described, for controlling the position of the tool therein, combined and operating substantially as described.

5. In a relieving-machine, an adjustable oscillating fixture, substantially as described, a table, as D , laterally adjustable upon table B , and provided with means, substantially as described, for carrying that fixture, a table, as B , adapted to carry the laterally-adjustable table, and means, substantially as described, for oscillating the fixture, all combined and operating substantially as and for the purposes described.

JOHN WORTH HEYER.

Witnesses:

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