

No. 831,919.

PATENTED SEPT. 25, 1906.

H. H. ABERNATHY.

WISE.

APPLICATION FILED FEB. 11, 1903.

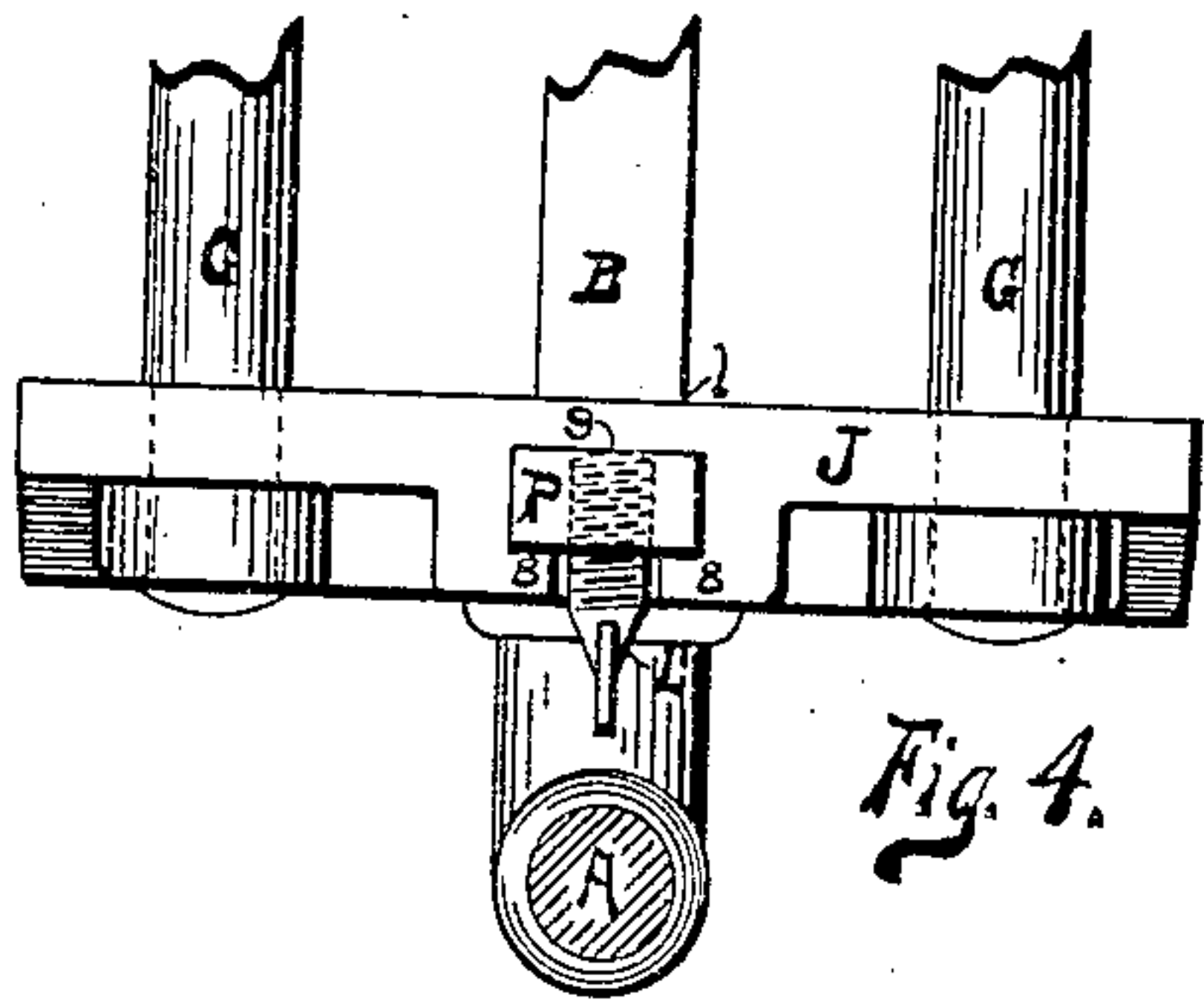


Fig. 4.

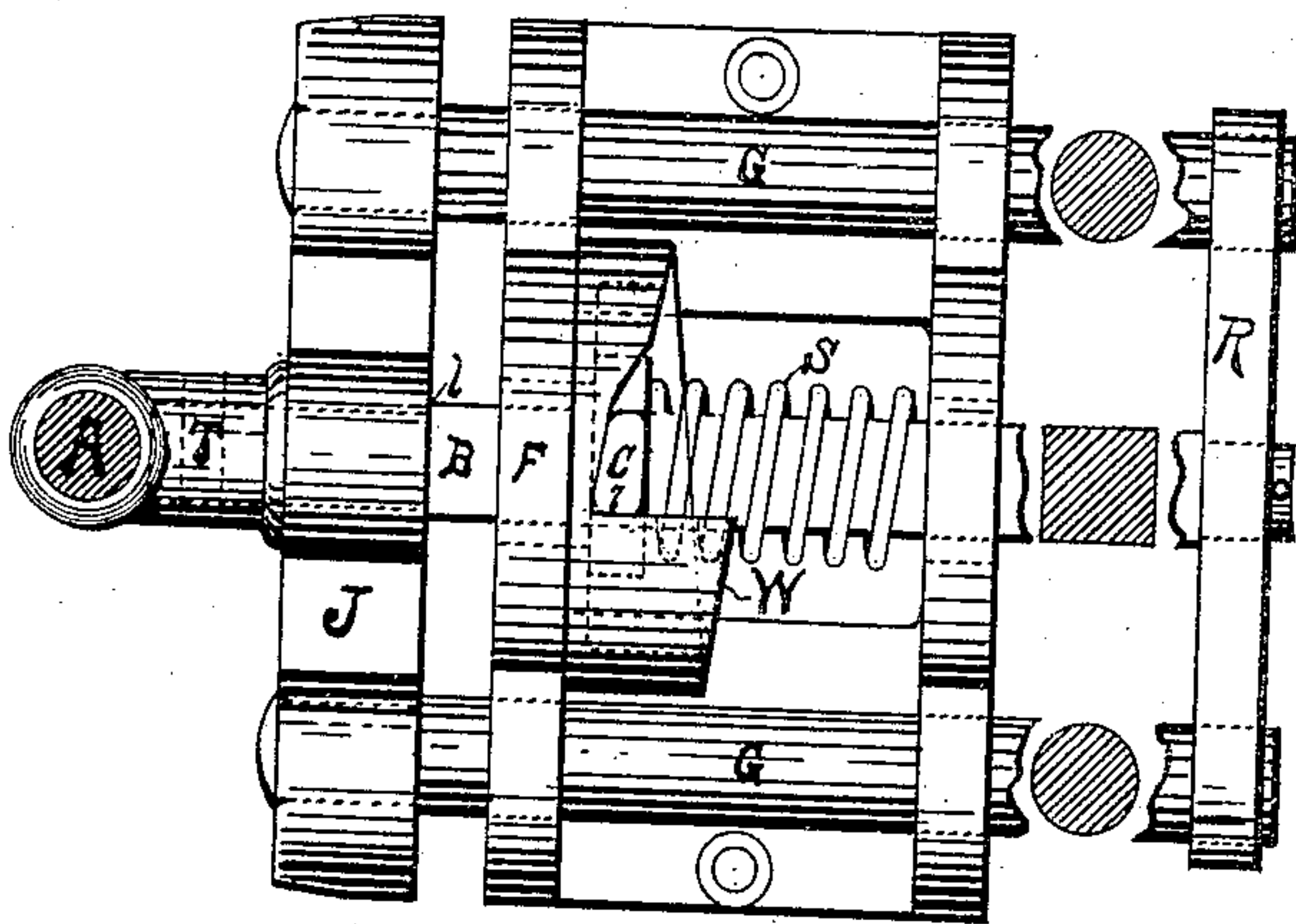


Fig. 1.

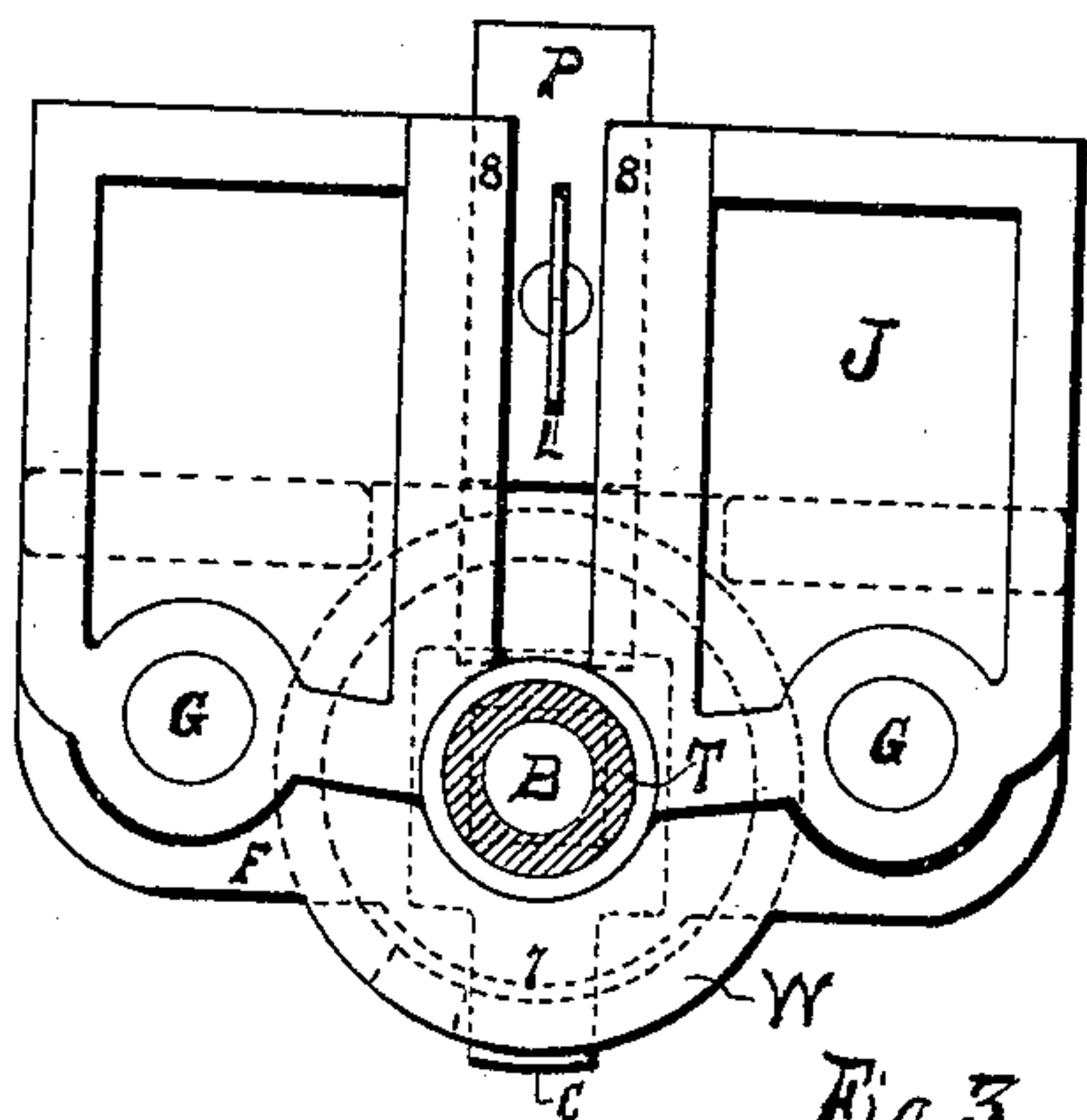


Fig. 3.

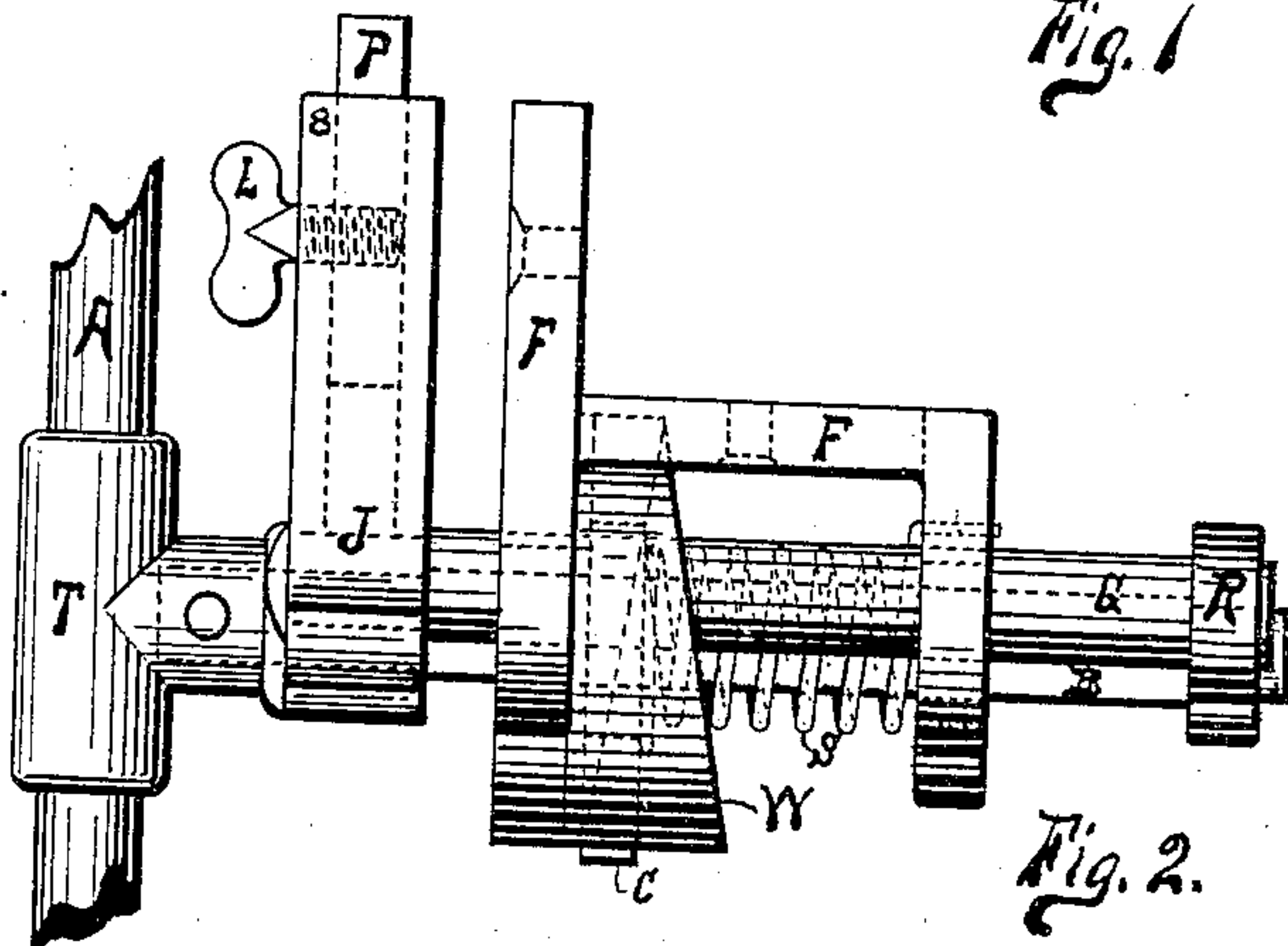


Fig. 2.

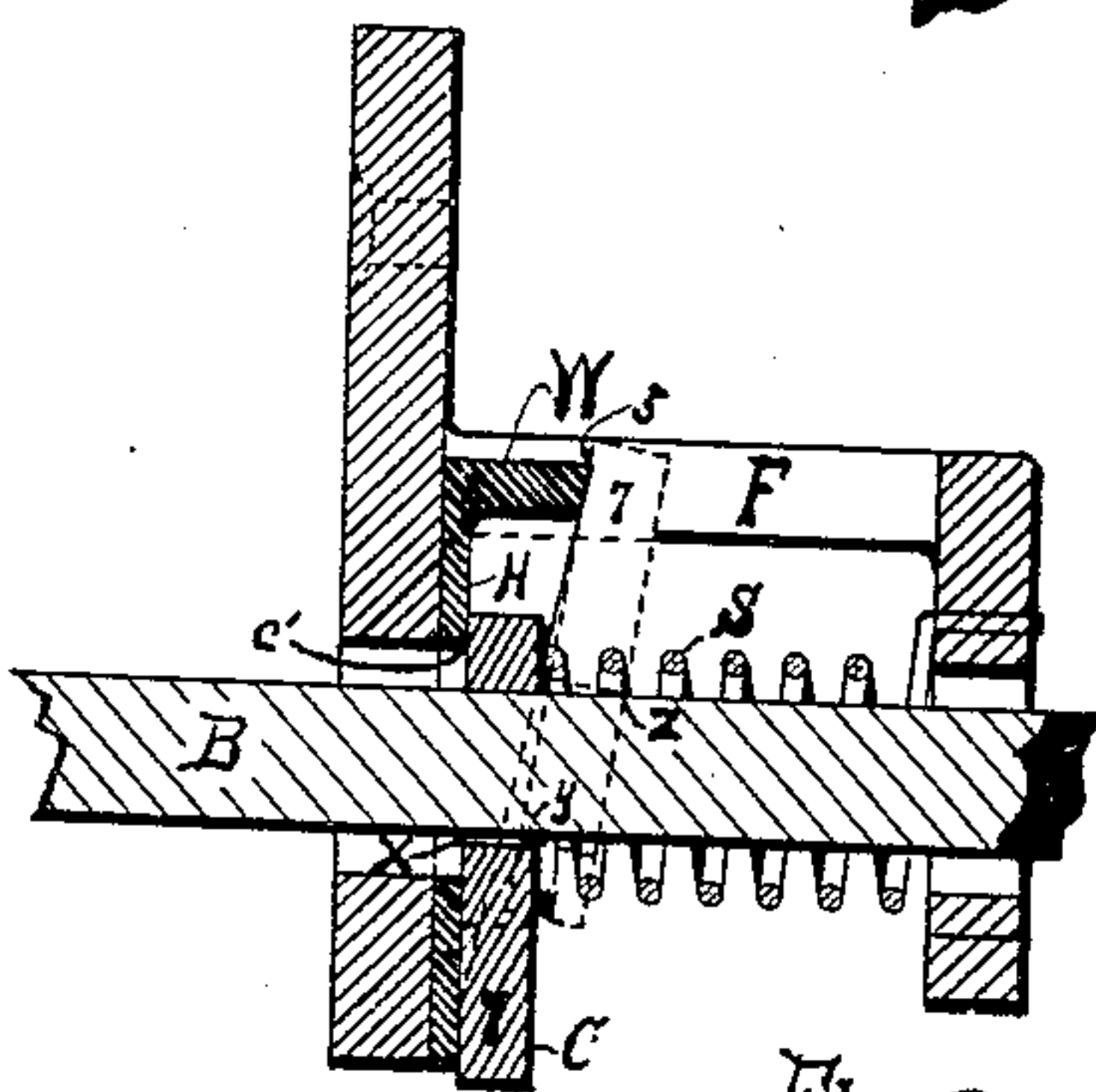


Fig. 6.

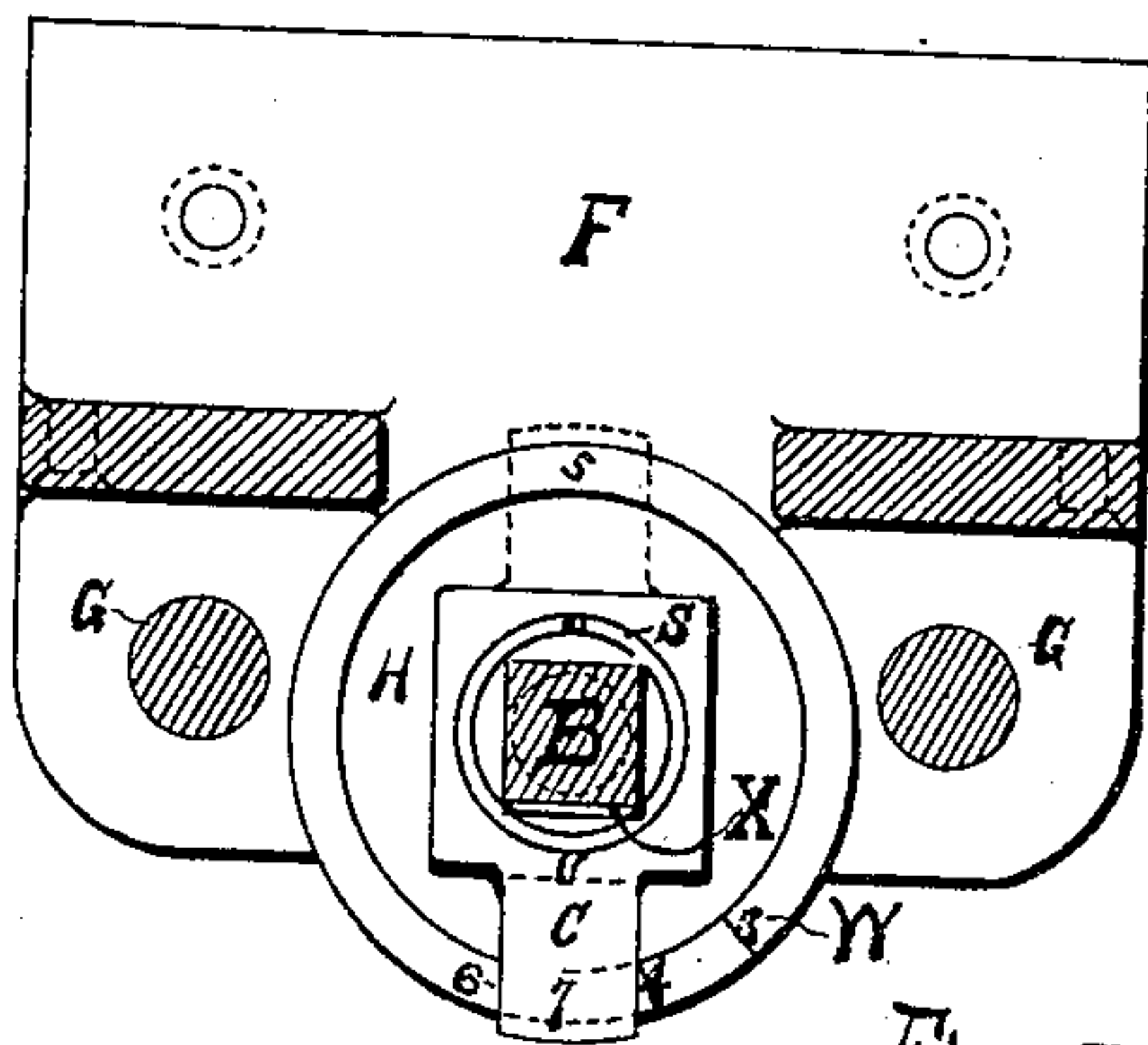


Fig. 5.

WITNESSES:

L. A. Weaver
Mrs O. J. Parnell

INVENTOR

Hugh H. Abernathy

UNITED STATES PATENT OFFICE.

HUGH H. ABERNATHY, OF CHICAGO, ILLINOIS.

WISE.

No. 831,919.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed February 11, 1903. Serial No. 142,961.

To all whom it may concern:

Be it known that I, HUGH H. ABERNATHY, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Vises, of which the following is a specification.

My invention relates particularly to that class of vises which are termed "quick" or "rapid-acting" vises.

The old and most common construction of a vise is the combination of a front movable jaw, which is drawn toward a back stationary jaw or abutment through the action of a screw which engages with a solid nut anchored in the rear jaw or abutment, the screw then passing through the front jaw, to which it is rotatably attached by a collar, to the front end of the screw, there being attached a handle or lever by which the screw is turned. This construction gives the clamping force required, but involves a great loss of time when the articles to be held in the vise are of various sizes, it ordinarily requiring from twelve to twenty-four revolutions of the screw for a six-inch adjustment of the jaws, revolutions for other distances being proportional.

The purpose of this invention has been to devise a clamping mechanism which will save this annoyance and loss of time, which will be simple in construction, strong, durable, and capable of economic production, and one in which the movable jaw may be locked at any point by a constant and but slight movement of the handle, in practice a quarter-turn of the handle being all that is necessary to hold the material for any ordinary purpose.

The principal feature of this invention relates to the clamping device, which may be used with any desired construction or design of jaws and their respective supports. Though the construction described is very serviceable, it is also designed to use the clamp device for other purposes than in the operation of vise-jaws.

In the accompanying drawings, wherein the same letter or figure refers to the same part in all the views, Figure 1 represents a bottom view. Fig. 2 represents a side view. Fig. 3 represents a front view. Fig. 4 represents a top view of the front jaw. Fig. 5 represents a rear end view of the cam W, the clamp C, the spring S, and a section of the clamp-bar B, guides G G, and a part of the

frame F. Fig. 6 represents a lateral section through the center line of the frame F, showing the clamp C in two positions.

J represents the front or movable jaw of a vise.

F represents the rear or fixed jaw or abutment and in the construction here shown forms a frame to which other elements of the device are attached.

G G represent two guides or supports for the front jaw J, to which they are securely attached. They then extend through holes in the lower part of the frame F, through which they may be freely moved. The back ends of G G are attached to and support the tie-plate R.

The frame F is provided with the necessary holes for attaching the vise to a bench. A top lug forms the rear jaw of the vise and is in alinement with the front jaw. Two lugs on the bottom of F, besides serving as a support for the rods G G, are provided with another set of holes through which pass a rod B. On the back surface of the front lower lug, surrounding the hole through which rod B passes, there is either attached or cast as an integral part of the frame F a cam W of any desired design and proportions.

Mounted upon bar B is an element (which will be hereinafter called the "clamp") which is attached to bar B (which will hereinafter be called the "clamped" bar) in any convenient way, so that it must rotate with the clamp-bar B, but at the same time be free to move laterally upon said bar when said clamp C is not in action, as will be hereinafter explained. Said clamp C has a lug extending from one edge, of such length that it will when mounted upon clamp-bar B reach to the outer circumference of the cam W. Said clamp C is held normally against the surface of the cam W by a spring S, which surrounds the clamp-bar B and operates against the front side of the rear lug or frame F.

Clamp-bar B corresponds to the screw or rack in other forms of clamps and vises and is that element through which force is applied between the opposing jaws of the device. It is rotatably attached to the front jaw J, but in such a way that it has no lateral motion in said jaw. In the particular construction shown there is a shoulder turned upon the rod at point I and a collar pinned to that part of the rod which protrudes from the front side of the jaw J, the collar in this instance being a portion of a member marked T, which

serves to attach a handle or lever A to the end of the clamp-bar B, by which handle the device is ordinarily operated. The rear end of the clamp-bar B is supported by the tie-plate R.

The clamp-bar B does not necessarily, and preferably does not, have any bearing directly or indirectly upon the holes through which it passes in the frame F; but for it to have such a bearing would not be at variance with the principle upon which the device is planned.

The clamp-bar B may be of any desired shape so long as its sectional outline is not a perfect circle, or should it be desired to use a round rod a feather or spline or friction device may be used to rotate the clamp C; but the most convenient, inexpensive, and serviceable shape is a square rod which is the most angular for turning the clamp C and at the same time presents the broadest and most substantial surface possible for engagement with the clamp C.

The particular construction of the spiral cam W and the clamp C and their relative position are best shown in Figs. 5 and 6. The clamp C is of any desired material and thickness and is provided with a hole which registers snugly with the sectional outline of the clamp-bar B, but enough larger to allow of its free lateral movement upon the clamp-bar B when it is held perpendicular (or nearly so) to the axis of said bar B. In the views shown the size of the hole X is somewhat enlarged, so as to more clearly show the action of the clamp. One side of the clamp C is provided with an extension or lug 7, which is of sufficient length to engage with the working face of the cam W. The working side of the lug 7 is beveled off to register with the angle of the cam, as shown in Fig. 1, though this beveled surface is not a necessary part in the principle involved. The cam W is rigidly attached to frame F or is an integral part of said frame and is in the form of a hollow spiral rising from a flat surface which is practically perpendicular to the axis of clamp-bar B. The working surface of the spiral or cam may be regular in design; but to secure better results it is divided into three parts: first, the space from 6 to 4, which is the lowest section and represents the location of the clamp C when it is at rest on the clamp-bar B, in which position the clamp C is held practically perpendicular to the bar B by being forced into contact with the inner flat surface H of the cam W, as shown at *c'*, Fig. 6, by the spring S, which surrounds the bar B and reacts against the inner surface of the rear lug forming part of the frame F, though other constructions may be used to secure the same results, thus allowing the free movement of the clamp-bar B through the opening in clamp C. When the point 7 of clamp C is slightly raised, as shown at point 5 in

Fig. 6, the points or edges Y and Z of the opening X are brought into contact with the respective sides of the clamp-bar B in such a way as to bind the clamp C firmly to the clamp-bar B. This contact may be either in the form of a ratchet by having the surface of the clamp-bar B corrugated to register with the point Z or it may be, and preferably is, simply a frictional contact wherein the relative proportions of the length of the lug 7 and the transverse distance between the working points Y and Z are such that the leverage secured is in any desired degree greater than that necessary to overcome the lowest probable coefficient of friction between the metals used. The second portion of the cam-surface 4 to 3 is a comparatively steep angle wherein any free movement which is allowed for releasing the clamp C from the bar B may be taken up quickly and with but a slight rotation of the bar B. The space 3 5 6 is of regular spiral design and may be of any angle desired. At the point 6 there is an abrupt descent to the first division of the cam-surface, which forms an abutment to prevent the reverse rotation of the clamp-bar B beyond the releasing-point.

The clamping action of the vise may be described as follows: Turning the handle A rotates the clamp-bar B, which in turn rotates the clamp C. When the point 7 of the clamp C arrives approximately at the point 3 on the cam W, the clamp C is locked firmly to the clamp-bar B relative to any further lateral movement of the bar B through the clamp C in the opposite direction to the application of force by the cam W. Therefore when upon a further rotation of B and C the point 7 on C arrives at any point on W, as at 5, the bar B will have been drawn through the hole in the center of the cam W to such an extent as the point 5 is farther than the point 3 from the surface H. This relation of parts is shown by the sectional view, Fig. 6, and since the bar B is attached to the front movable jaw J this element, with its supports G G, is drawn toward F in equal measure with the lateral movement of B relative to the surface H.

Points Y and Z may be sharp corners, but when used upon a smooth bar are preferably rounded off to prevent any marring of bar B.

For very heavy strains the space X can be elongated in the direction of lug 7 and a small block or shoe inserted, which is not shown in the drawings, which will distribute the pressure applied by Z to a broader surface upon B, thus preventing any possibility of marring bar B.

A further improvement consists of a dog adjustably attached to the front of the movable jaw J by means of lugs 8 8, between which is a vertical space to allow the passage of the screw L, which engages in the dog P and impinges upon the surface 9, Fig. 4, and

pushes the dog P against the inner surface of the lugs 8 8, thus holding the dog P in adjustment against the surface which should carry the strain in service. The opening between 8 and 8 is designed to extend to the bottom of the mortise made to accommodate the dog P, thus preventing the accumulation or allowing for an easy way to remove dirt, &c., which might otherwise gather in the bottom of the mortise and interfere with a free and full adjustment of the dog P.

Having thus described my device, that which I claim as my invention, and desire to secure by Letters Patent, is—

1. In a clamping device the combination of a rotating clamp-bar, a clamp mounted upon said bar and means for locking said clamp relative to a lateral movement on said clamp-bar by the rotation of said clamp-bar.

2. In a clamping device the combination of two opposed jaws, a clamp-bar rotatably attached to one jaw, a single cam-surface on the outside of the other jaw, and a clamp mounted upon said clamp-bar in such a way that said clamp may engage with said cam-surface, said clamp being operated by the rotation of said clamp-bar.

3. In a clamping device the combination of two opposed jaws, a clamp-bar rotatably attached to one jaw, a spiral surface on the outside of the other jaw, a laterally-adjustable clamp mounted upon said clamp-bar engaging with said spiral through the rotation of said clamp-bar.

4. In a clamping device the combination of two opposed jaws connected by suitable guides, of a spiral cam mounted upon the back side of one of the jaws, of a clamp-bar rotatably attached to the other jaw said bar passing freely through the other jaw and through a hole in the center of the said spiral cam and a laterally-movable clutch mounted upon said clamp-bar and engaging with said spiral cam for the purpose substantially as described.

5. In a clamping device the combination of a rotatable clamp-bar, the sectional outline of said bar being irregular or angular in shape, a collar mounted upon said bar having a lug on its edge of sufficient length to engage with a cam, a hole in said collar corresponding with the angles or irregularity of the bar-section, but slightly larger to admit of its free movement laterally upon said bar but not so large as to admit of a rotation of said bar in said collar, and not so large but that a slight tilting of the axis of the collar relative to the axis of the bar may cause the diagonally opposite edges of the hole in said collar to become engaged with their respective sides of the bar upon which said collar is mounted; a stationary cam, practically circular in form with the irregular or working face projecting from one side, a hole in the center of said cam to allow the passage of

said clamp-bar, a central flat area on the side of said cam between the said passage and the cam-face, which is of any desired width, said flat area being practically perpendicular to the axis of the clamp-bar or of any desired angle which will release the said collar from a working engagement with said bar when the lug extending from said collar registers with the lowest section of the cam and said collar is pressed against said flat central surface; and a means for holding said collar normally against said flat surface for the purpose described.

6. In a vise, a clamp-bar rotatably anchored to a front movable jaw, a means of rotating said clamp-bar, a means of support for the rear end of said clamp-bar, a clamp mounted upon said bar in such a way that it must rotate with said clamp-bar but said clamp-bar capable of a free lateral movement through said clamp, when said clamp is in one or more particular positions, a cam projecting from a surface of the rear jaw in a direction opposite to the front jaw upon the working surface of which the said clamp may directly or indirectly engage through the revolution of said clamp-bar.

7. In a vise the combination of a front movable jaw, a clamp-bar rotatably anchored to said front jaw, a means for rotating said clamp-bar, a clamp mounted upon said clamp-bar, means for rotating said clamp and means for freeing said clamp for lateral movement upon said bar when in a particular position, a rear jaw in alinement with the front jaw, an opening in said rear jaw for the free passage of said clamp-bar, a hollow spiral plane concentric with the axis of said clamp-bar and surrounding said opening in the rear jaw and projecting in a direction opposite to the front jaw; a surface surrounding said opening in said rear jaw and within the said hollow spiral or cam, which is practically perpendicular to the axis of said clamp-bar; a projection from the said clamp capable, when mounted upon said clamp-bar, of engaging with the said spiral plane and means for holding said clamp normally against said perpendicular surface for the purpose described.

8. In a vise, the combination of suitable jaws a rotatable clamp-bar; a clamp mounted upon said clamp-bar and capable of engagement with said cam for the purpose of first tilting and thereby locking said clamp to said clamp-bar and second for drawing the clamp-bar in a desired direction, said engagement of said clamp and cam being accomplished by a rotation of the clamp-bar, a means for rotating said clamp-bar and a spring for holding said clamp normally out of working engagement with said clamp-bar.

9. The compression mechanism of a clamp or vise consisting of a rotatable feed-bar of square section, a collar loosely mounted upon

said bar, the hole in said collar registering with the sectional outline of said feed-bar, a cam surrounding said bar, the irregular or working surface of said cam projecting in a direction parallel to the axis of said bar, a projection from said collar adapted to engage with the working surface of said cam, a means of rotating feed-bar, a means of support for holding said feed-bar practically in the center of said cam, a means of holding said collar in apposition to the working surface of the said cam, and means for attaching said cam and said bar to the respective jaws of a clamp or vise.

10. In a vise the combination of suitable jaws and their means of operation of a clamp having a hole registering with the sectional outline of the bar upon which it is mounted and a lug or projection extending from the periphery of said clamp, the working surface of said lug being beveled to the same angle as the principal working surface of the cam with which it engages.

11. In a vise the combination of suitable jaws, a clamp-bar and a clamp; of a cam which is circular in form with a hole in the center for the passage of a clamp-bar, with a suitable surface surrounding said hole against which a clamp may be forced for the purpose of freeing said clamp from engagement with the clamp-bar upon which it is mounted and with a cam-face surrounding said last-described surface, the variation of height of said cam-face being in a direction practically parallel to the axis of the said clamp-bar, said cam-face being divided into a short steep incline for locking said clamp to said bar and a long regular spiral incline for operating said movable jaw through the agency of the rotating clamp-bar; an abrupt, practically perpendicular descent from the highest to the lowest plane of the cam-face, which forms an abutment to prevent the reverse turning of the clamp and clamp-bar beyond this point.

12. In a vise the combination of suitable jaws a clamp-bar, a clamp, and a cam said cam having a central surface practically perpendicular to the axis of said clamp-bar; of a compression-spring surrounding said clamp-bar and forcing said clamp against said perpendicular surface when the lug on said clamp may be at or about the lowest point on said cam for the purpose described, and any suitable abutment for holding the opposite end of said spring.

13. In a vise the combination of suitable jaws and clamping device of a dog adjustably attached to the front or movable jaw by means of lugs projecting from the front surface of said jaw and partially surrounding said dog and a screw engaging in said dog, the head of said screw passing through a ver-

tical space which extends between the said lugs for their full length, the point of said screw after passing through the said dog operating against the inner wall of the mortise which contains the dog, forcing the dog against the inner surface of the said lugs thus holding it in any desired position.

14. In a vise the combination of a movable jaw J; rods G, G supporting said jaw J; frame F composed of a top lug which serves as the back fixed jaw of the vise, a front lower lug which carries the cam W and a rear lug which serves as an abutment for spring S; holes in both of said lower lugs for the accommodation of rods G, G and clamp-bar B, also suitable holes in said frame F for attaching said vise to a suitable support; of an angular clamp-bar B, both ends of which are rounded where they engage with their respective supports, rotatably anchored to the front jaw J by the shoulder I, and the collar T which is attached to bar B beyond the outer surface of J; of collar T provided with a transverse passage for the accommodation of handle A; of the tie-plate R which is supported by the rods G, G and holds them in alinement and which in turn supports, alines and forms a bearing for the rear end of clamp-bar B; of cam W projecting backward from the rear face of the front lug on F, containing a hole for the accommodation of bar B, a surface H instrumental in releasing clamp C from bar B, a cam-face 4, 3, 5 and 6 of any desired shape and dimensions for directing and controlling the movements of clamp C; of a clamp C mounted upon bar B in such a way that it must revolve with the bar B but in such a way that bar B may have a free lateral movement through it when said clamp C is in or approximately in its normal position against the surface H, clamp C being provided with a lug 7 for engagement with cam W, the working surface of said lug 7 being beveled to agree with the principal working surface of the cam W, the corners Z and Y of the clamp C being beveled or rounded to make a broader and more substantial contact with bar B and of a spring S surrounding and supported by bar B and acting against clamp C to force it normally against the surface H, and when in action to keep it constantly in working apposition to the clamp-bar B and the cam W substantially as and for the purpose described.

Signed at Chicago, county of Cook, State of Illinois, this 7th day of February, A. D. 1903.

HUGH H. ABERNATHY.

Witnesses:

JOHN W. FEHULE,
J. H. HENSER.