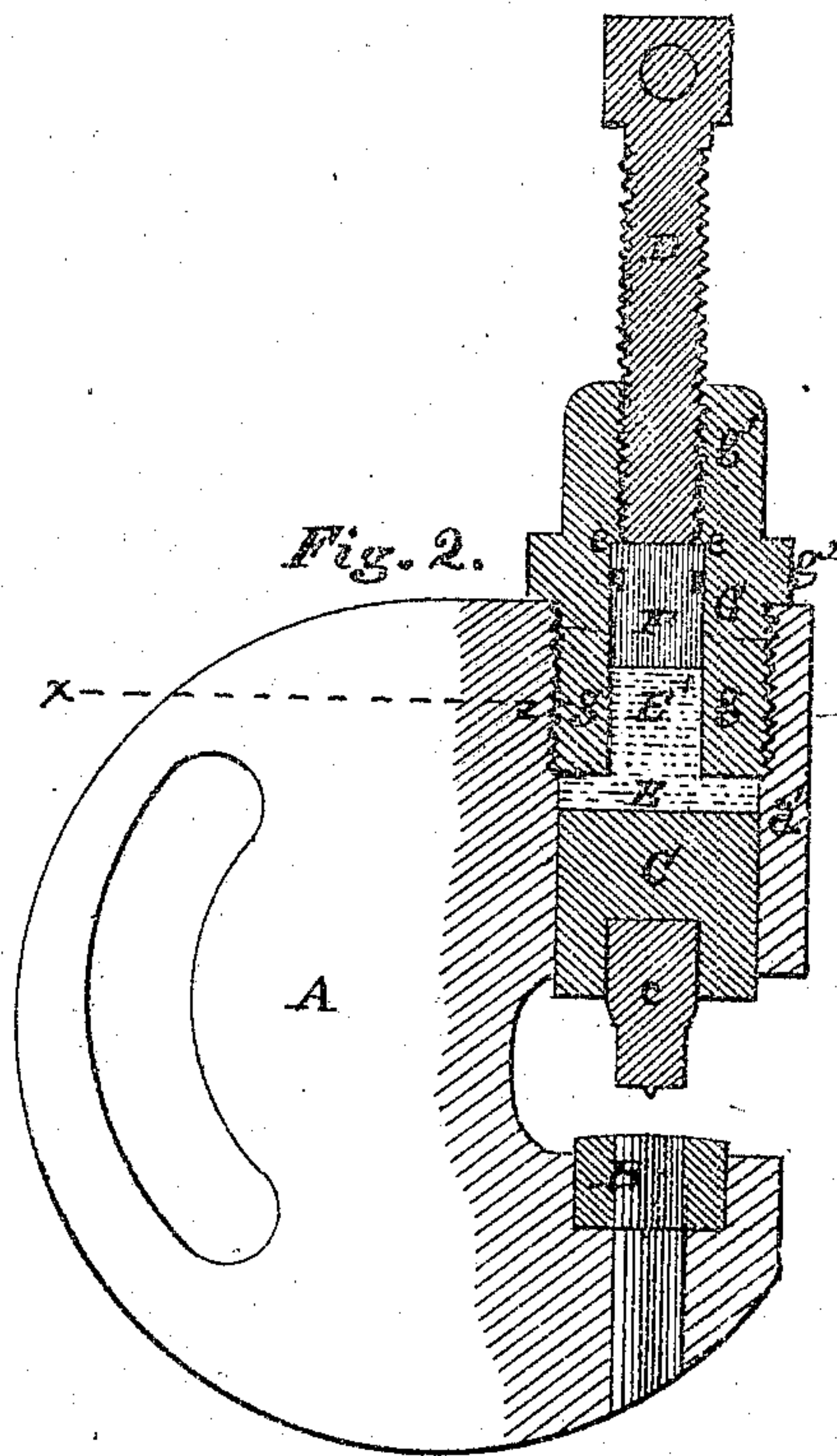
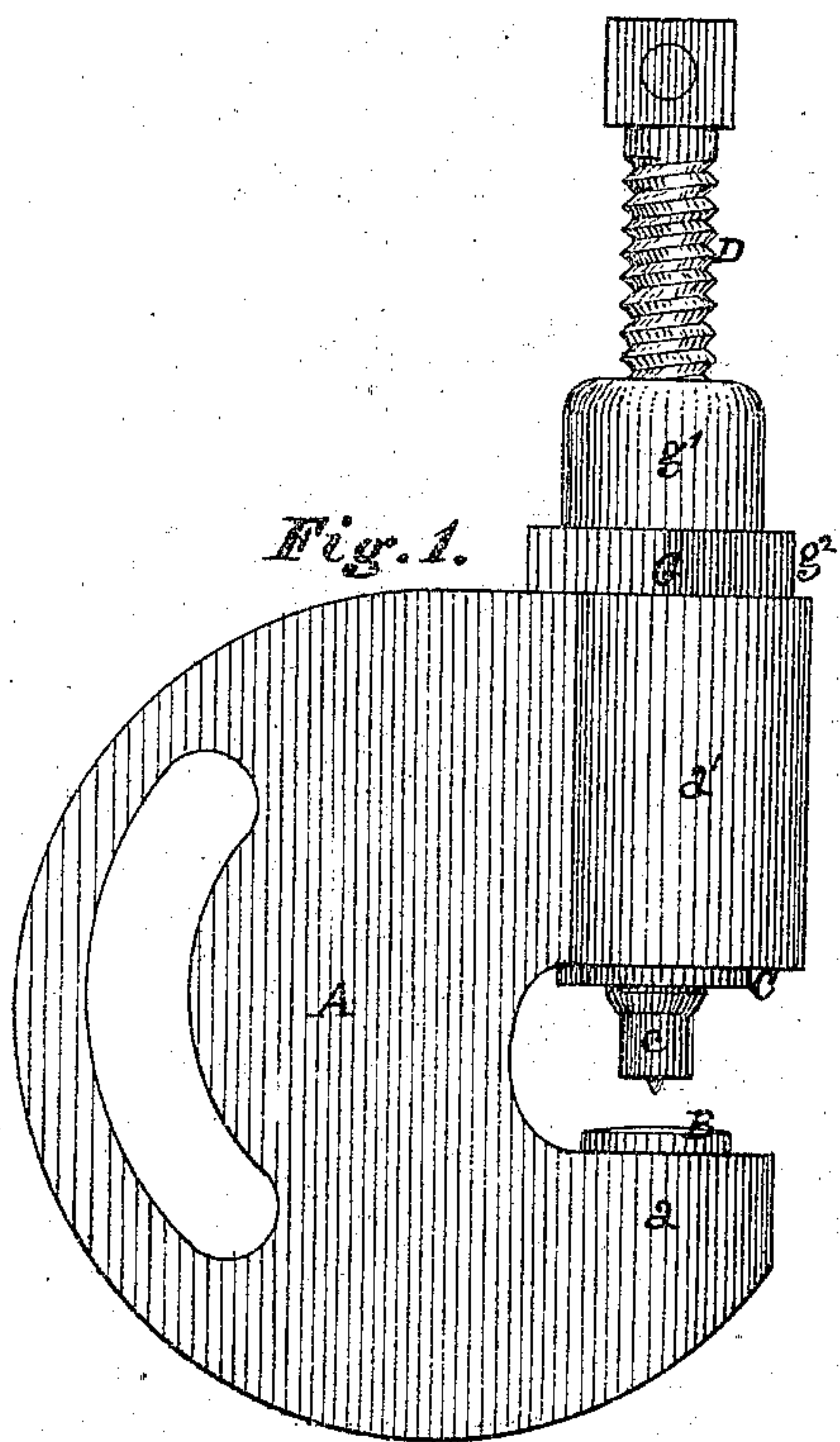
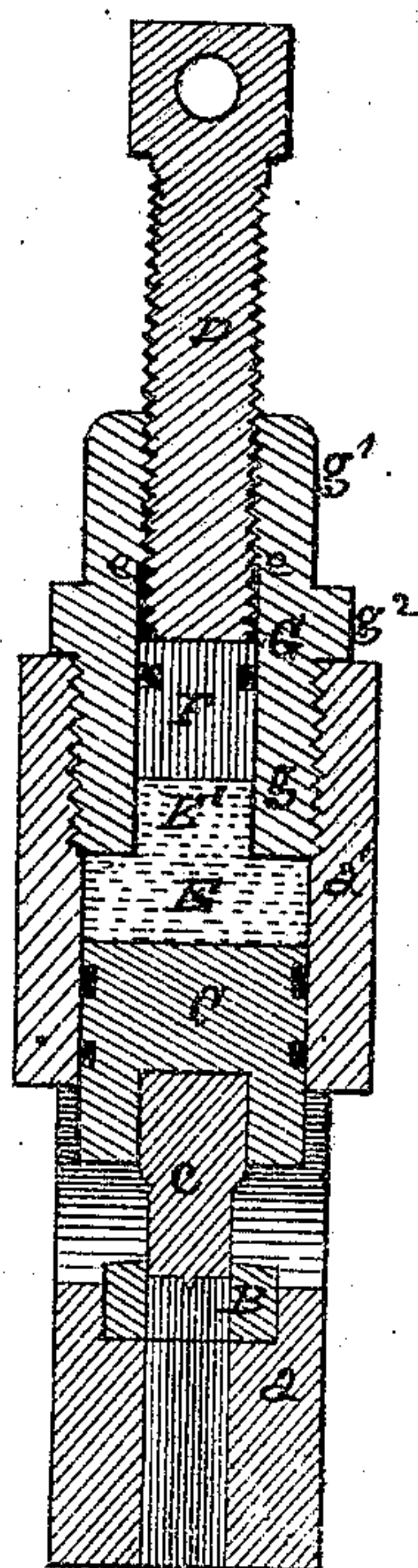


ROBERT LIVINGSTON.
 Improvement in Hydraulic Punching Machines.
 No. 120,203. Patented Oct. 24, 1871.



Scale, $\frac{1}{4}$ inch to
1 inch.



Witnesses { Alex. Selkirk, Robt Livingston
 Cha. Seckuk. Inventor.

UNITED STATES PATENT OFFICE

ROBERT LIVINGSTON, OF ALBANY, NEW YORK.

IMPROVEMENT IN HYDRAULIC PUNCHING-MACHINES.

Specification forming part of Letters Patent No. 120,203, dated October 24, 1871.

To all whom it may concern:

Be it known that I, ROBERT LIVINGSTON, of the city and county of Albany, State of New York, have invented certain new and useful Improvements in Hydraulic Punching-Machines; and I do hereby declare that the following is a description thereof, reference being had to the accompanying drawing forming a part of this specification.

Figure 1 represents a side view of the machine embodying the improvements in this invention. Fig. 2 is a sectional elevation of the same, illustrating the apparatus at rest. Fig. 3 is a transverse sectional elevation of the same, illustrating the improvements in the operation of punching.

My invention consists in the arrangement of certain elements with a hydraulic punching-machine, whereby the fluid or equivalent pressing material used in the press-chamber can be used in less quantities, and will be more perfectly confined therein, and the several parts of the machine will be rendered more capable of resisting the excessive pressure exerted on them when in operation, and the whole will require less special attention when being operated.

To enable others skilled in the art to make and use my invention, I will proceed to describe it in reference to the drawing and the letters of reference marked thereon, the same letters indicating like parts.

In the drawing, A represents the body or yoke of the machine. B is the die, inserted into the lower arm *a* of the body. C is the punching-plunger, carrying the punch *c*. D is the operating screw; all of which are old and have been used. In the arm *a'* of the body A I form the chamber E, which I denominate the major press-chamber, which chamber has a diameter equal to that of the plunger C, and a length sufficient to receive the length of the said plunger or a little more. The portion of the said major chamber unoccupied by the said plunger is intended to receive a portion of the fluid (tallow preferred) used. The portion of the arm *a'* above the major chamber E is also bored and furnished with a screw-thread, and is preferably made of the same diameter as the chamber E, and its upper surface is made even and true to act as a seat for the shoulder of the coupling-piece G. Into the said screw-threaded bore I insert the coupling-

piece G, the lower portion of which is furnished with a screw-thread, *g*, corresponding with the screw-thread cut in the bore made in the upper portion of the arm *a'*. Immediately at the upper termination of the screw-thread *g* of the coupling-piece G I form the shoulder *g'*, the lower surface of which fits nicely on the even and true upper surface or seat of the arm *a'*, before referred to, so as to render the juncture of the said coupling-piece with the arm water-tight, and prevent all escape of the fluid from the chamber E. In the coupling-piece G I form a fluid-chamber, E', which I denominate the lesser chamber. The said lesser chamber is of a diameter considerably smaller than the major chamber E, and opens at its lower end directly into the said major chamber without any intermediate valve or other device or separation, for separation or prevention of the return of the fluid from the said major chamber to the said lesser chamber. The greater the difference between the area surface of the diameters of the said chambers E and E' the more powerful will the machine be to operate. In the upper portion of the lesser chamber E' I place the loose solid piston F, which piston is of the same diameter as the bore of the said chamber, and is properly packed, as shown in Figs. 1 and 2. By the employment of the said piston F to act direct on the fluid in the press-chamber below all opportunity for the escape of the fluid from the same is prevented, and a small charge of fluid in the machine can be operated for a great length of time. Working into a screw-thread made into the coupling-piece G above the piston F is the operating-screw D, which screw impinges on the upper end of the said piston, as shown. The said screw is intended to operate upon the piston F by axial contact to force the same down on the fluid in the press-chamber below to operate the plunger C. The said screw is intended to be operated by any suitable lever or wrench applied to its head.

In this invention it is not necessary in all cases to have the several parts so arranged that the line of the axis of the screw D, piston F, and lesser chamber E' will be made to run parallel and the same with the axis of the major chamber E; and the lesser chamber may be arranged in such a manner that the line of their axis will be at right angles with the axis of the said major chamber and plunger, as indicated by the dot-

ted lines x and z in Fig. 2, or at any other desired angle with the same results.

I am aware that a major and a lesser chamber are common in hydraulic jacks and other machines; but in such machines the said chambers do not open directly into each other as in my invention, but are remotely removed, and are separated by proper valves or equivalents. In such cases I do not claim as new the arrangement of a lesser chamber with a major chamber. I am also aware that a screw similar to the operating-screw used by me has been used in hydraulic punching-machines; but those screws were arranged to operate directly on the fluid and not on a piston placed intermediate between the said screw and the fluid as in my invention; and in those punching-machines operated by a screw working directly on the fluid the fluid would in all cases escape from the press-chamber by the way of the screw-thread as the said screw is operated, which necessitates the frequent changing of the machine. I, therefore, do not claim the employment of the operating-screw so arranged. I am also aware that in the hydraulic punching-machine heretofore made a coupling-piece has been used; but such coupling-pieces were constructed to contain all the several operating parts of the machine, while in my invention the plunger and major chamber are

without the said coupling-piece, while the lesser chamber and piston (not used by others) only are located therein.

The advantages of the improvements in my invention are these: A small charge of fluid is made to operate most effectually without any loss for a great length of time; the upper surface line of the fluid is preserved below the top of the arm, which renders the machine stronger; and the operator will not be liable to cast the plunger up beyond a desired point, as the said plunger will be stopped by the lower end of the coupling-piece, and will, therefore, lose no time in operating.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The coupling-piece G, constructed with the lesser chamber E' and provided with the shoulder g' , in combination with the arm a' provided with the major chamber E and plunger C, when all are arranged to operate substantially as and for the purpose set forth.

2. The combination of the lesser chamber E', loose piston F, screw D, with the major chamber E, plunger C, and body A, when all are arranged to operate substantially in the manner set forth.

Witnesses: ROBT. LIVINGSTON.

ALEX. SELKIRK,
CHAS. SELKIRK.

(119)