

No. 672,316.

Patented Apr. 16, 1901.

G. A. DORNIN.

APPARATUS FOR PUNCHING METALLIC BODIES.

(No Model.)

(Application filed Aug. 9, 1900.)

3 Sheets—Sheet 1.

Fig. 1.

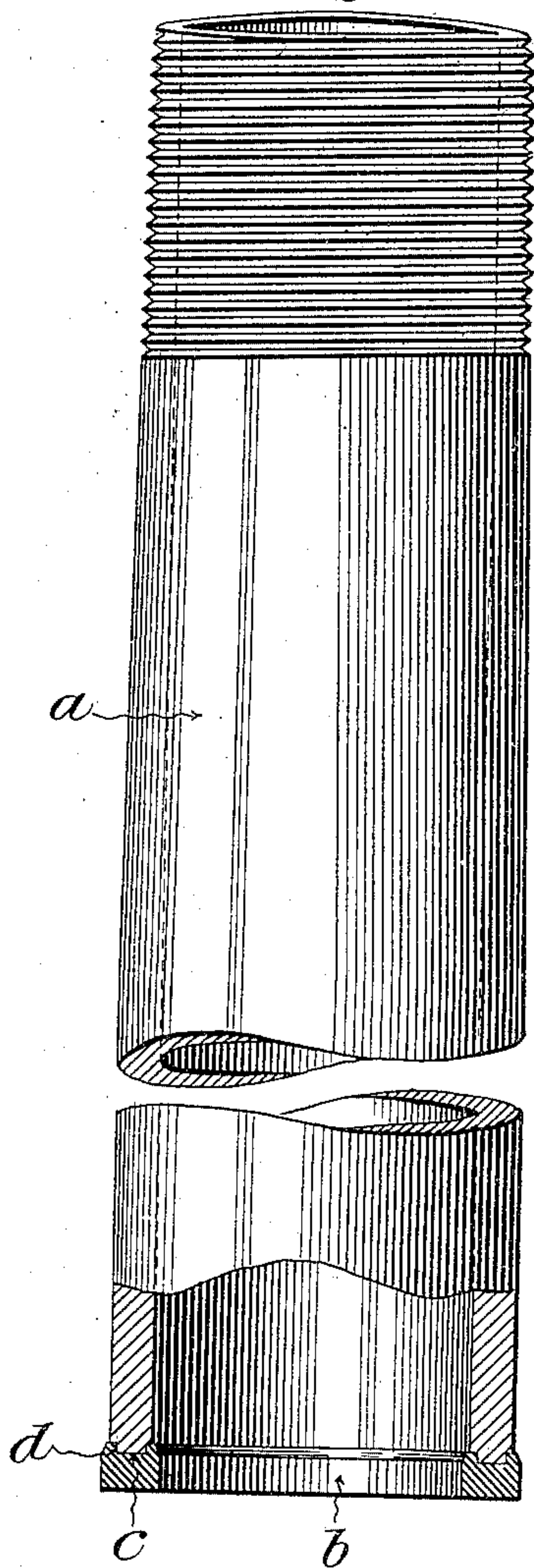


Fig. 2.

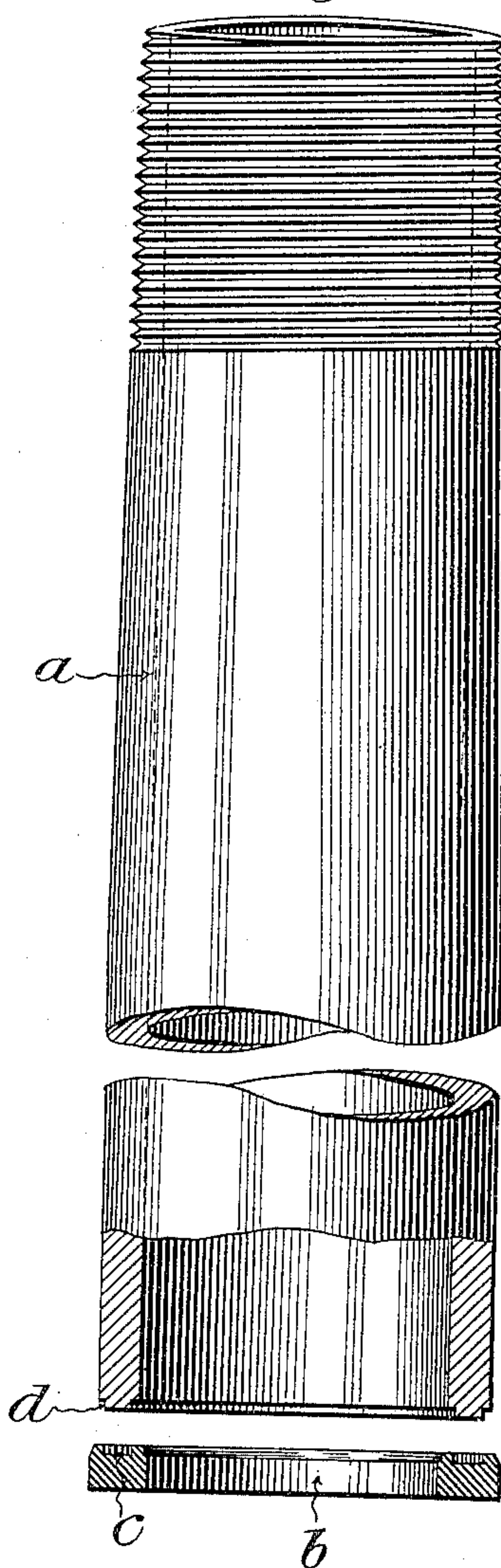
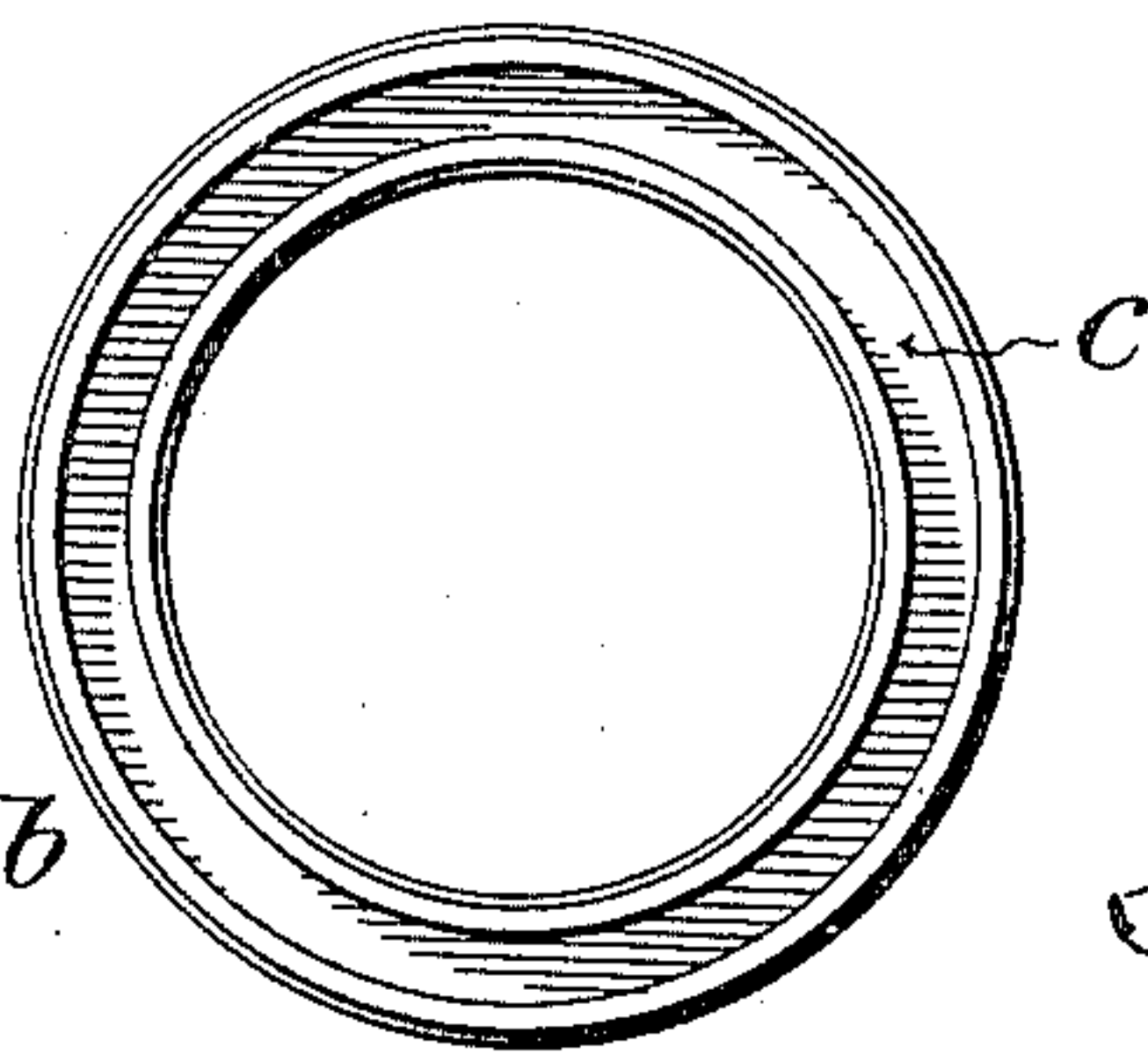


Fig. 3.



Witnesses:

A. M. Long.
E. A. Bunker.

Inventor:

George A. Dornin
by W. H. Finckel
Atty

No. 672,316.

Patented Apr. 16, 1901.

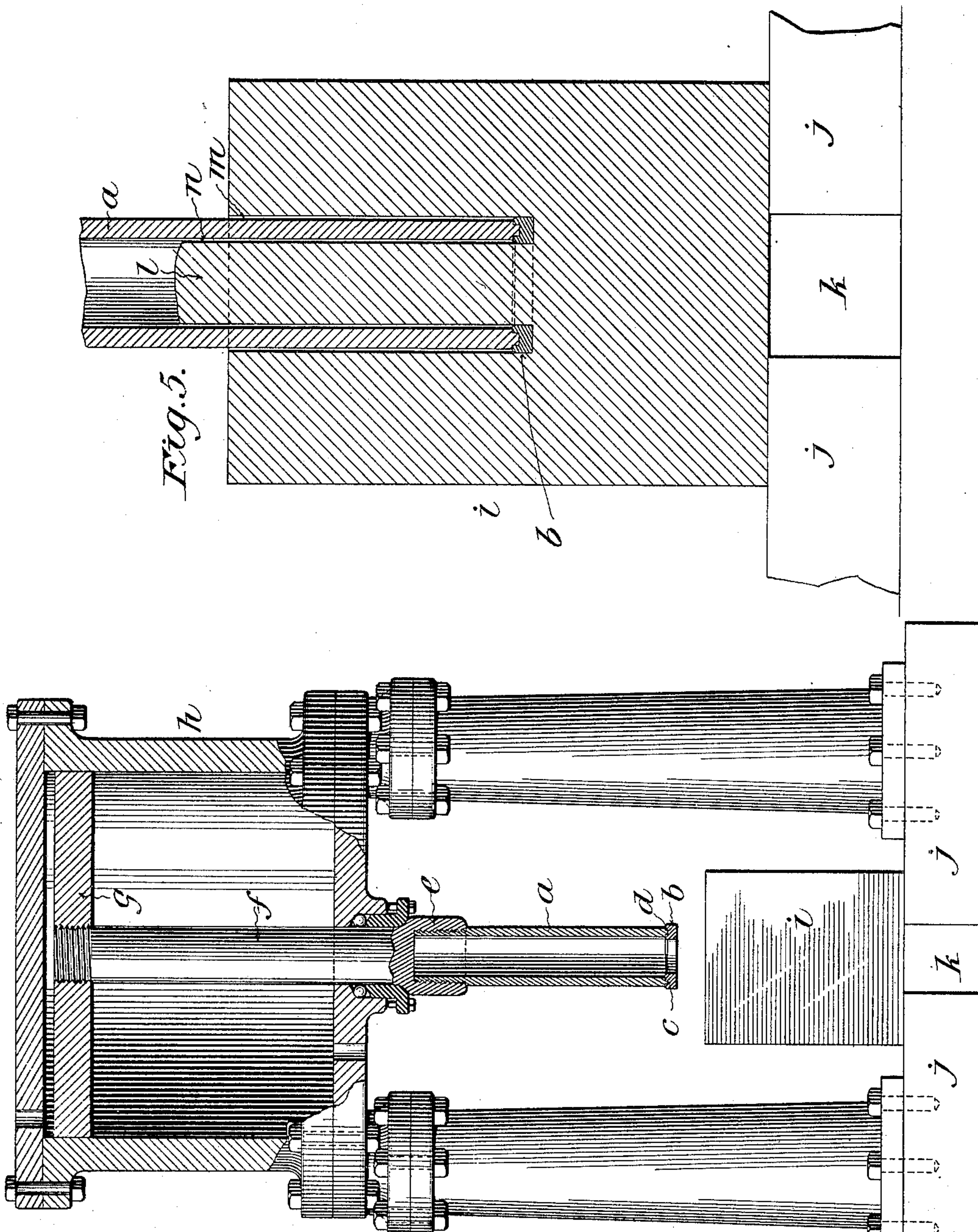
G. A. DORNIN.

APPARATUS FOR PUNCHING METALLIC BODIES.

(No Model.)

(Application filed Aug. 9, 1900.)

3 Sheets—Sheet 2.



Witnesses:

A. M. Long.
E. A. Finckel.

Fig. 4.

Inventor.
George A. Dornin
by W. M. Finckel. Atty.

G. A. DORNIN.

APPARATUS FOR PUNCHING METALLIC BODIES.

(Application filed Aug. 9, 1900.)

(No Model.)

3 Sheets—Sheet 3.

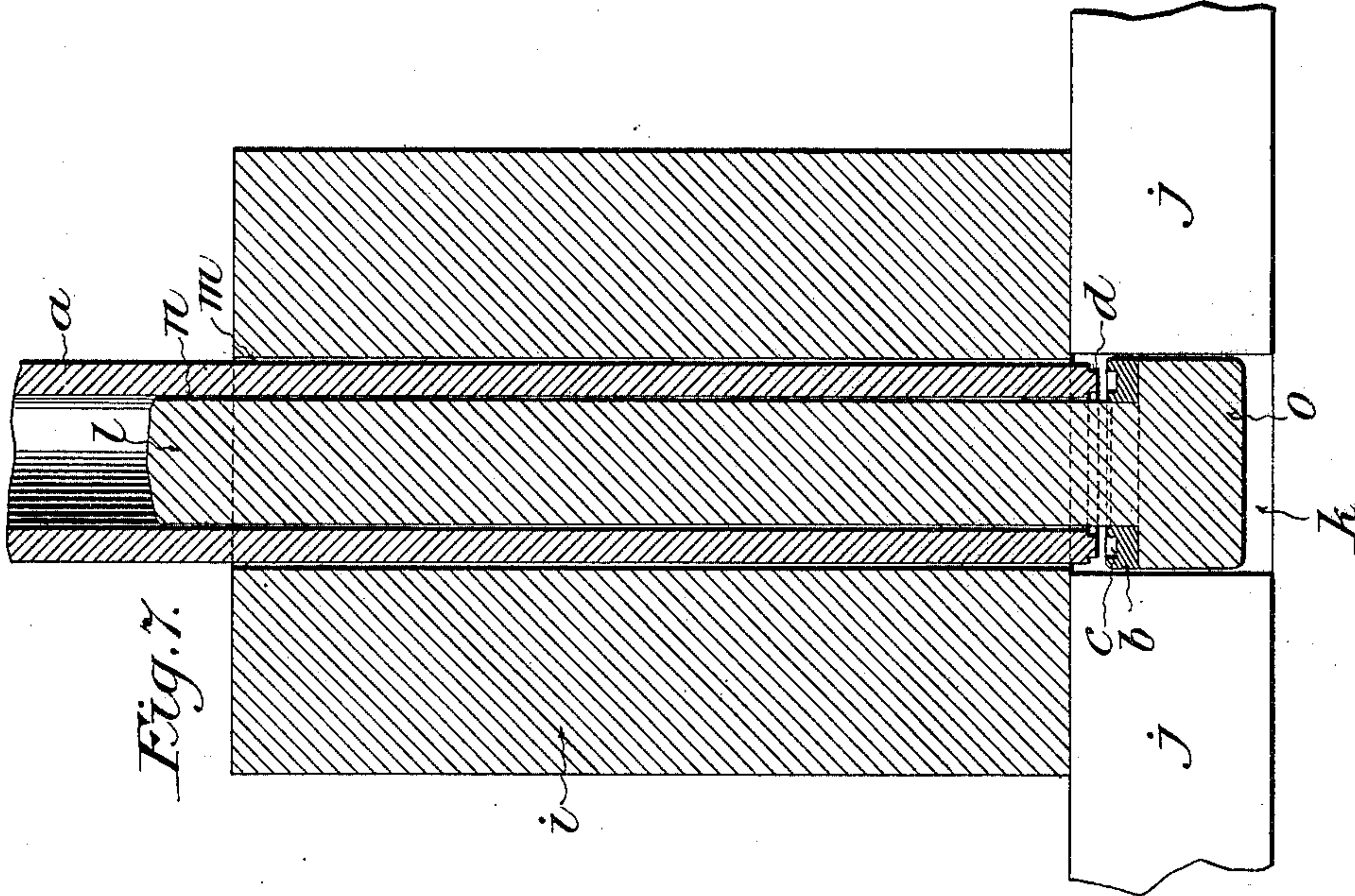


Fig. 7.

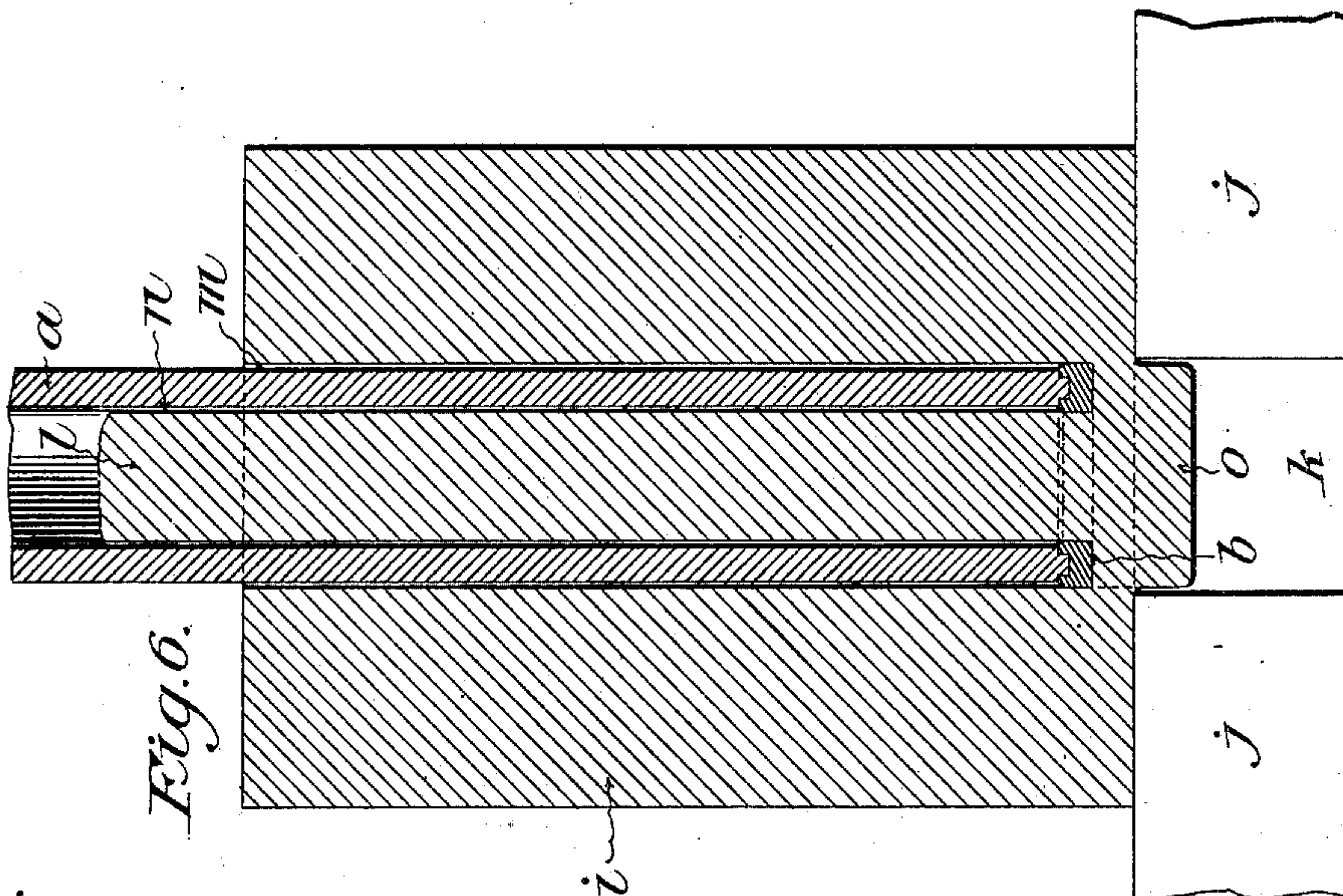


Fig. 6.

Witnesses:

A. M. Long
E. A. Finckel

Inventor:

George A. Dornin
by W. M. Finckel
Atty

UNITED STATES PATENT OFFICE.

GEORGE A. DORNIN, OF BETHLEHEM, PENNSYLVANIA.

APPARATUS FOR PUNCHING METALLIC BODIES.

SPECIFICATION forming part of Letters Patent No. 672,316, dated April 16, 1901.

Application filed August 9, 1900. Serial No. 26,396. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. DORNIN, a citizen of the United States, residing at Bethlehem, in the county of Northampton and State of Pennsylvania, have invented a certain new and useful Improvement in Apparatus for Punching Metallic Bodies, of which the following is a full, clear, and exact description.

The object of this invention, stated generically, is to provide means for punching holes in blocks or ingots of metal; and, stated specifically, it consists in means for removing the central portion or core of blocks or ingots, so as to obtain the outer portion for manufacture into tubular or other articles.

Prior to this invention hollow punches have been used for a variety of purposes; but in attempting to use them for cutting out the core of a hot ingot it has been found that the punch welds with the metal, and its usefulness is ended with the first operation. Indeed, the heat has so affected the punch as to cause it to bend in operation. A hollow punch possesses many advantages for making holes in bodies of metal, not the least of which is the fact that it provides for the escape or, in other words, takes care of the cut-out portion. In my efforts to use such a punch repeatedly I have found that it is necessary to keep the body of the punch out of contact with the metal, so as to prevent its distortion and adhesion to the block and core, and to effect this I provide the body of the punch with a separable service portion or leading end, hereinafter termed a "cutter," which projects beyond the inner and outer surfaces of said body to such extent that as it is forced through the metal it leaves a space or clearance between the metal and the body of the punch, and although the cutter may be welded to or united with the cut-out portion or core the body of the punch itself is unimpaired and may be reused repeatedly, a new cutter only being required.

One special application of my invention consists in making hollow metallic bodies suitable for further treatment for conversion into any desired tubular or other articles of manufacture, and an advantage of my apparatus is that the distortion of the block or ingot is

very slight, and it is therefore in the most desirable condition for further manufacture.

In the accompanying drawings, illustrating my invention, in the several figures of which like parts are similarly designated, Figure 1 is an elevation of the punch, partly broken away and with the leading end in vertical section, showing the cutter in position. Fig. 2 is a similar view with the separable service portion or cutter detached. Fig. 3 is a top plan view of the separable cutter detached. Fig. 4 is a sectional elevation showing in a conventional way my punch applied to a hydraulic press. Fig. 5 illustrates the operation of my punch when the same is about halfway into the block of metal to be punched. Fig. 6 is a view similar to Fig. 5, showing the conditions of parts when the punch is nearly through. Fig. 7 is a view similar to the last two preceding views, but with the punch passed entirely through the block.

The body *a* of the punch preferably is tubular and cylindrical, although it may be oval or any other shape suitable for producing the desired hole or opening or perforation in the metal being treated. This hollow or tubular body may be made of any suitable metal, and its leading end is constructed or adapted in any suitable way to receive a separable cutter *b*, which cutter is of less internal dimensions and greater external dimensions than the body, so as to project interiorly and exteriorly beyond the walls of the body, as clearly shown in all of the views. One simple and convenient construction for effecting a temporary union between the body *a* and the cutter *b* comprises a groove *c* in one which receives a tenon *d* of the other with a sufficiently-tight fit to cause the cutter to adhere to the body temporarily and sufficiently for working purposes. As already plainly indicated, however, I do not limit my invention to any particular construction of union between the body and the cutter. It is, however, material and of the highest importance that the cutter should project internally and externally beyond the parallel surfaces of the body, so that when said cutter is used it will make a hole in the metal of greater dimensions than the external dimen-

sions of the body, and thus prevent the external wall of the body from coming in contact with the metal being operated upon and will similarly reduce the dimensions of the
 5 core or portion cut out to less than the internal dimensions of the body, and therefore prevent contact between said core and the interior of the body. In this way the body of the punch is preserved from overheating and
 10 consequent deflection or deterioration and is also prevented from welding or adhering to the metal, and hence when the metal has been punched the body of the punch may be freely withdrawn and used again repeatedly.

15 In practicing my invention the punch may be arranged in a suitable coupling *e* on the end of the piston-rod *f* of the piston *g* of any ordinary hydraulic press *h*, and the block of metal *i* to be punched or perforated is arranged upon a bed-plate *j* or otherwise, with
 20 an opening *k* beneath the block for the discharge of the portion of the metal cut out by the punch. As the punch descends under the action of the press or whatever other
 25 power is used its cutter enters the mass of metal, and the metal displaced flows up inside of the punch, as shown at *l*, Fig. 5, while a space *m* is left between the outside of the punch and the metal, and a space *n* is left between the inside of the punch and the core.
 30 As the punching progresses toward the bottom of the block there is a displacement of the metal downwardly into the opening *k*, as shown at *o* in Fig. 6, and the tendency of the core to flow up into the punch is arrested. The final
 35 cut, as shown in Fig. 7, carries the metal out from the bottom through the opening *k*, and usually it will be found that the cutter *b* will be embedded in or welded to the cut-out portion, as indicated in said Fig. 7. The consequent loss of the cutter is immaterial when compared with the preservation of the punch
 40 itself, especially so as these cutters may be produced at comparatively slight cost. The hollow or perforated block of metal may then be treated for the manufacture of a merchantable article of any sort and in any way.

In the case of ingots where there is any piping my punch can be economically and advantageously used in removing the piped or
 50 imperfect portion, to the great improvement of the metal remaining.

I do not limit my invention to any particular apparatus for employing it, nor to the em-

ployment of the invention on hot or cold metal 55 or on any particular kind of metal or metallic alloy.

What I claim is—

1. Apparatus for punching metallic bodies, comprising a tubular body and a separable 60 cutter applied to said body and projecting beyond the inner and outer walls thereof, and means to force the cutter and body through a metal object, substantially as described.

2. A hollow punch, provided with a separable 65 cutter of less internal dimensions and greater external dimensions than the body, substantially as described.

3. A hollow punch, composed of a body having its leading end constructed for engagement 70 with a separable cutter, and said cutter of less internal and greater external dimensions than the body of the punch, substantially as described.

4. A hollow or tubular punch, comprising 75 a body, and a cutter arranged on the leading end of said body and connected therewith by a groove-and-tenon joint, the said cutter being of less internal and greater external dimensions than the body, substantially as described. 80

5. Apparatus for punching out the cores or axial portions of ingots, which said cores or axial portions may be piped or segregated, and for punching other metallic bodies, comprising a hollow punch-body having a separable 85 cutter of corresponding shape and of greater external and less internal dimensions than the body, said cutter adapted when forced into and through a metallic body to form a 90 hole therein larger than the external dimensions of the body of the punch, and displace the metal through the hollow interior of the body for a portion of its way and free of contact with such interior, the remainder of the 95 core or metal to be punched out, together with the cutter, being discharged by the punch-body from the end opposite to that which the punch entered, the punch-body itself capable of being withdrawn from the metallic body 100 in the reverse direction to that by which it entered.

In testimony whereof I have hereunto set my hand this 6th day of August, A. D. 1900.

GEORGE A. DORNIN.

Witnesses:

G. A. HART,

JOS. W. THURSTON.