

T. McGRATH.

PUNCHING TOOL.

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904,714.

Patented Nov. 24, 1908.

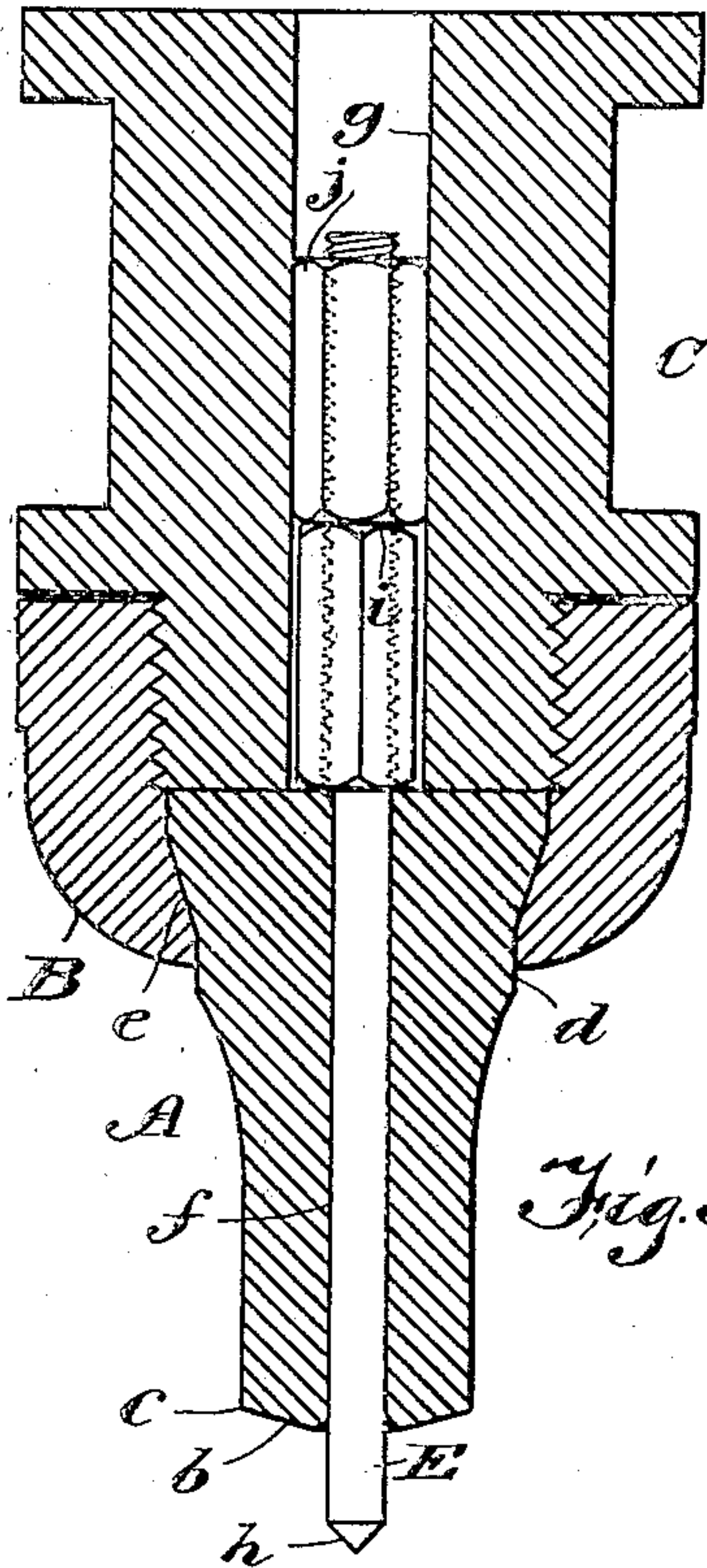


Fig. 2.

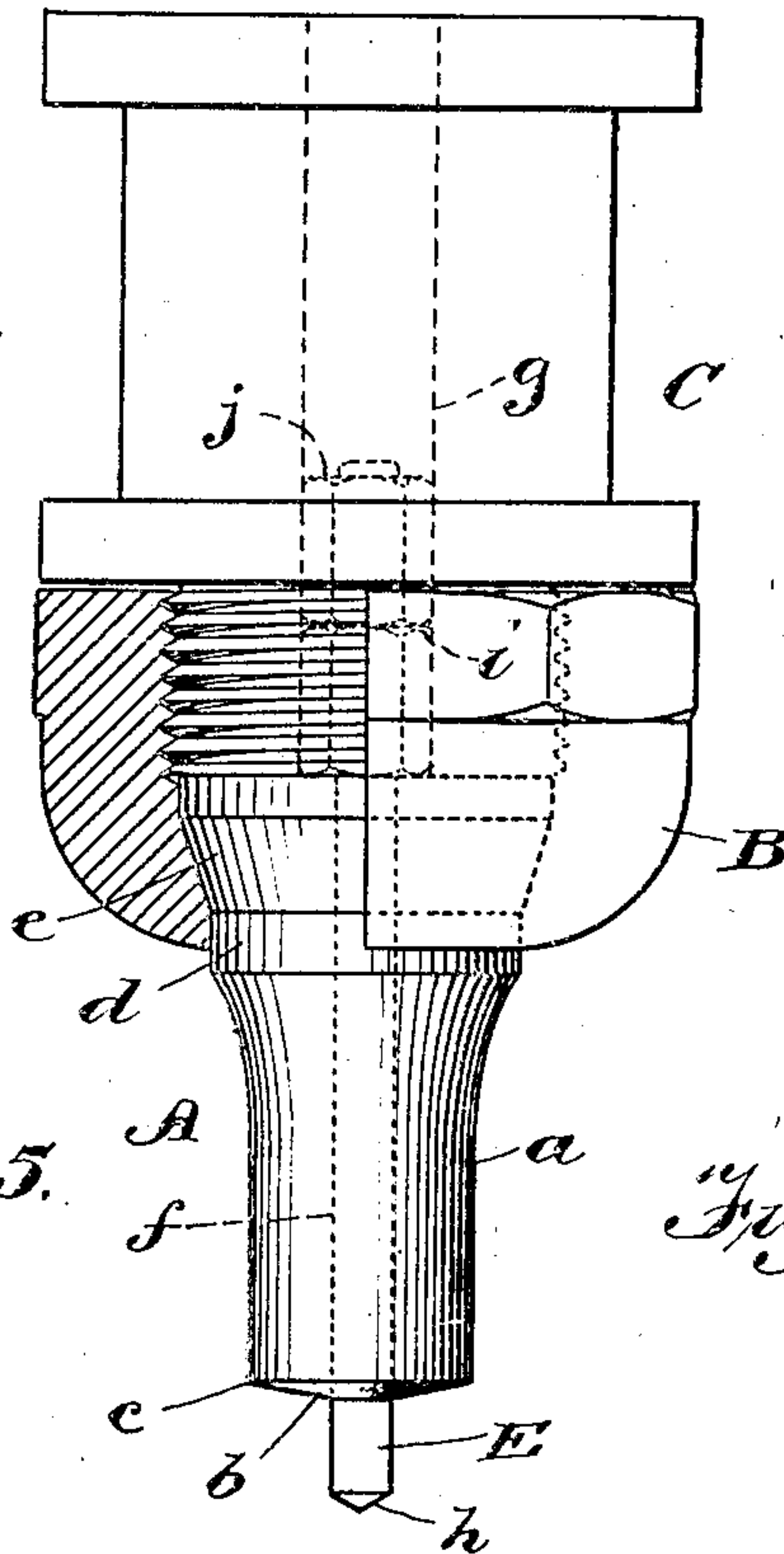


Fig. 3.

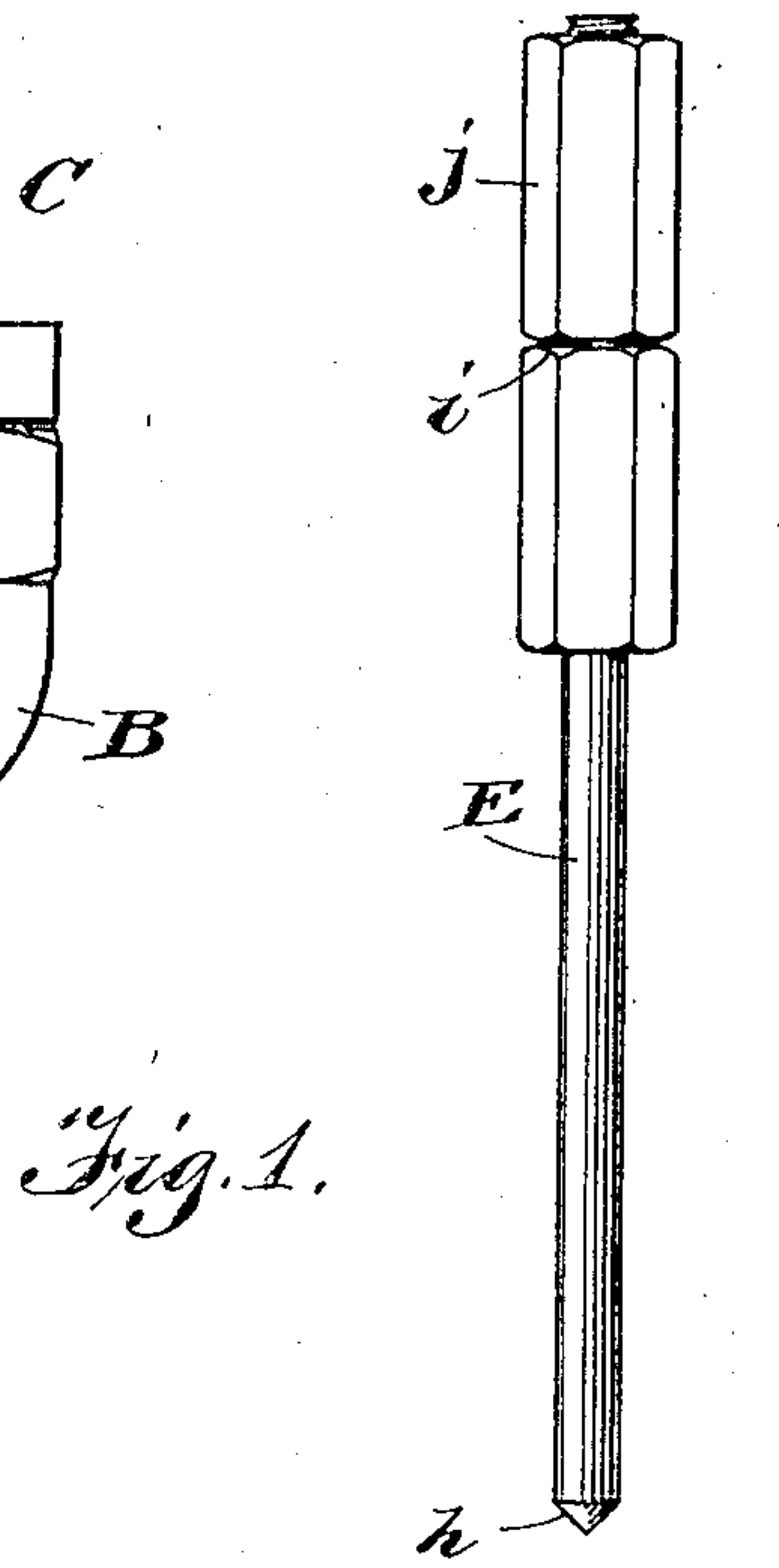


Fig. 4.

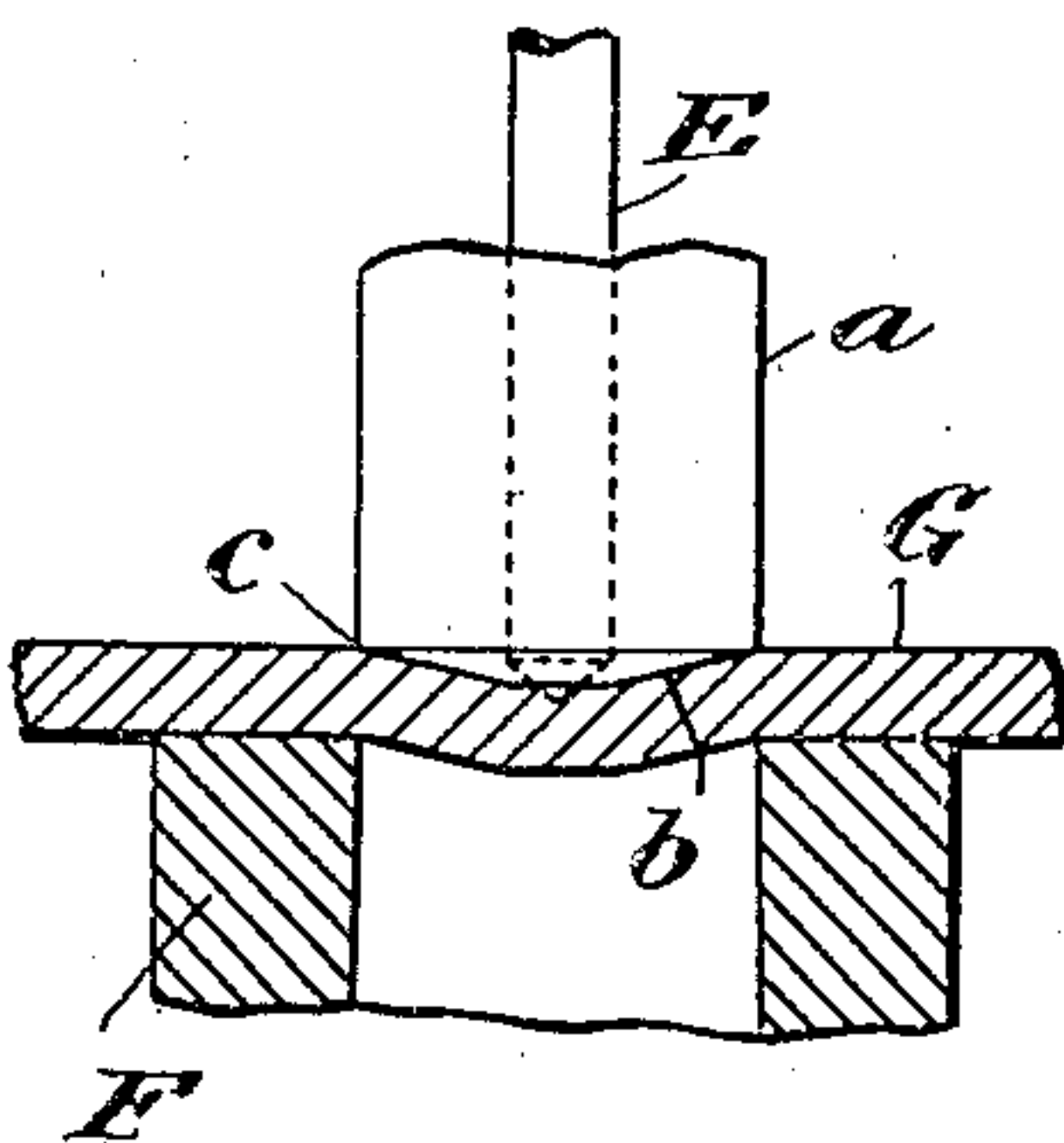
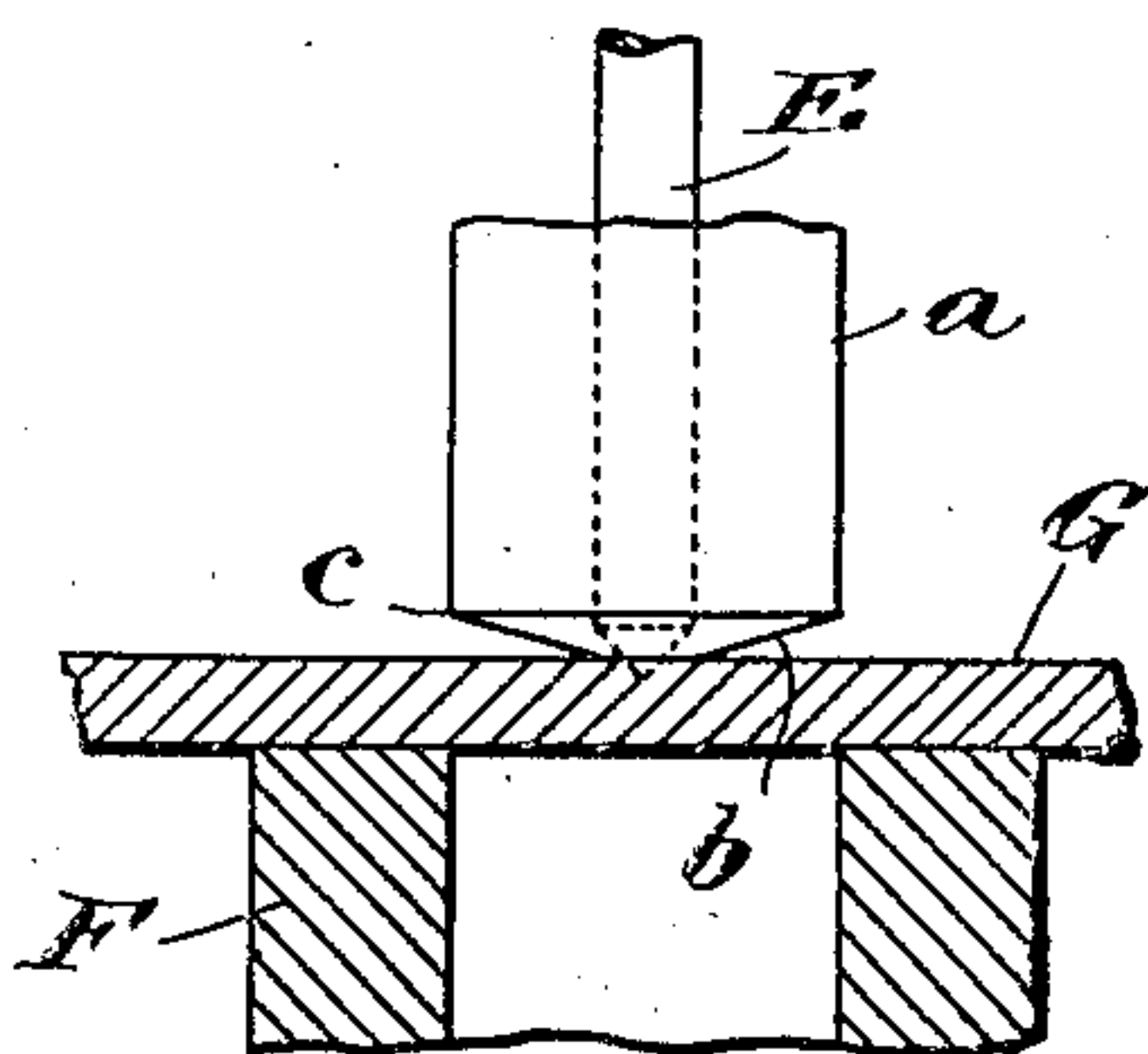
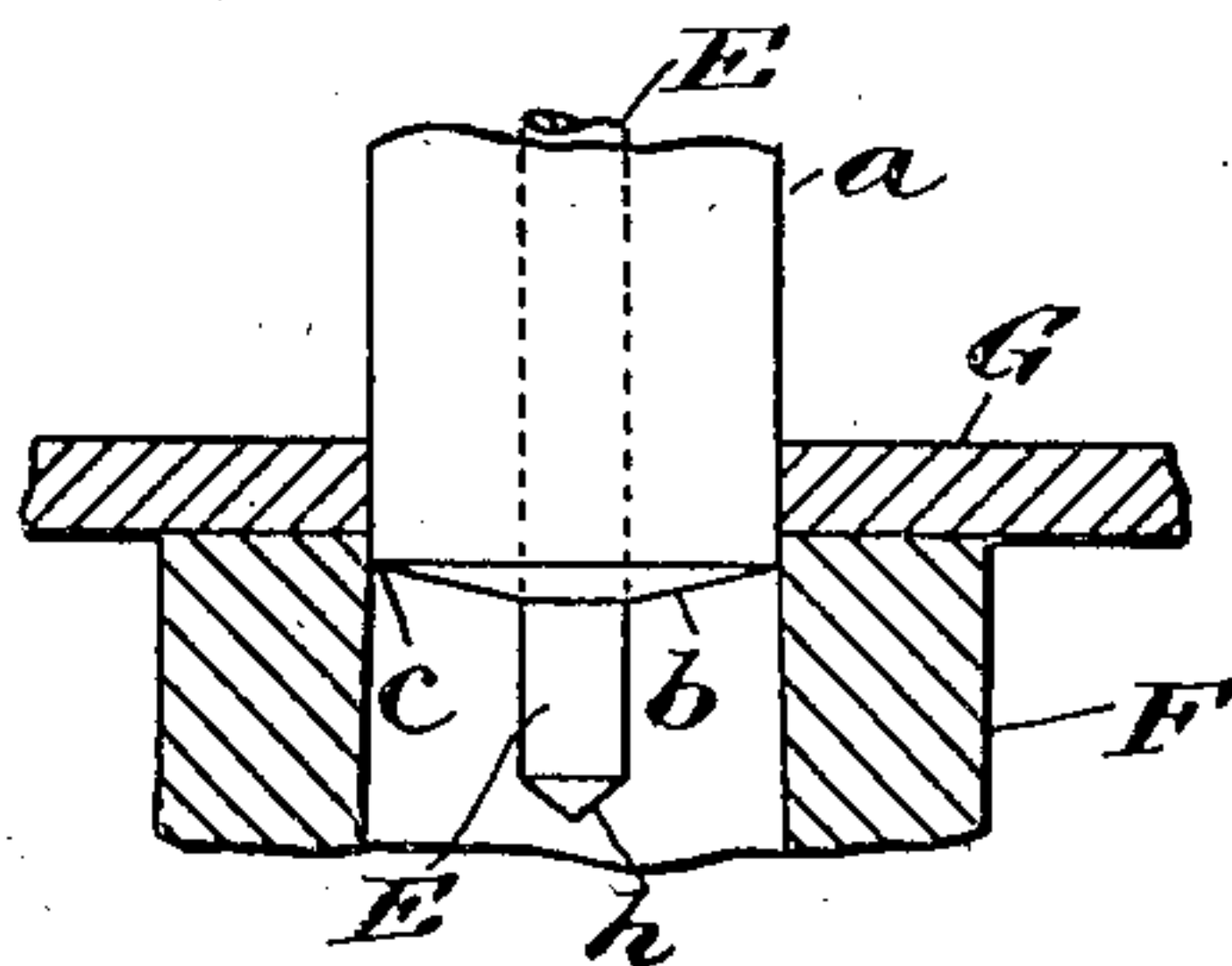


Fig. 6.



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UNITED STATES PATENT OFFICE.

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PUNCHING-TOOL.

No. 904,714.

Specification of Letters Patent.

Patented Nov. 24, 1908.

Application filed March 30, 1906. Serial No. 308,892.

To all whom it may concern:

Be it known that I, THOMAS McGRATH, a citizen of the United States, residing at New York, borough of Manhattan, in the county of New York and State of New York, have invented a certain new and useful Punching-Tool, of which the following is a specification.

This invention relates to a punch especially adapted for punching holes in metal and hard materials.

The object of the invention is to provide a new construction adapted to punch a hole which is free from jagged or rough edges. The new tool is very simple in construction, and particularly durable in use, it having been found in practice that several thousand holes can be punched by one tool without re-facing or re-sharpening said tool. The punching surface can be easily and quickly ground to again sharpen the tool. Furthermore, the tool operates efficiently in punching thick or heavy metal plates. The new punch will not break in service, and it will not injure the edge of the die with which it coöperates.

In a prior patent granted to me December 26, 1905, #808,470, I have disclosed a punching tool which is provided with a cutting edge and with a recessed or countersunk face, said edge lying in advance of said countersunk end surface of the tool. Practical experience with a tool of this construction has demonstrated that it will operate successfully only on soft metals, such as copper, and analogous materials. Furthermore, the patented tool will not punch thick metallic sheets or plates, nor will it punch hard metals.

My newly constructed tool, in contradistinction to the one disclosed in my prior patent aforesaid, has a punching face extending forwardly of, or projecting beyond, the cutting edge, and as the tool approaches the work, the projecting punching face engages with the metal before the punching edge comes into action, the cutting edge gradually approaching the metal, whereby the metal is deflected by the embedding of the punching face therein, the subsequent operation of the cutting edge producing a hole with smooth edges. It has been found that this type of punch produces a hole the

metal surrounding which is not torn or disrupted radially to anything like the extent as occurs with the punches of the prior art.

In practice I prefer to make the projecting punching surface or face of the tool, convex or substantially so, or frusto-conical or substantially so. The tool is preferably made circular in cross section, though it may be of any shape desired, and it has a sharp cutting edge, the punching surface projecting in front of said cutting edge.

In the operation of punching a hole in a metallic sheet, particularly if it is a thick or heavy sheet, the tool ordinarily used is liable to break, or to slip on the surface of the work; and, furthermore, the edges of the hole are rough and irregular, thus making it necessary to finish the holes by filing away the rough edges thereof.

The new tool is not open to these objections. When the tool is brought into contact with the work by the pressure exerted by the press, the projecting punching surface of said tool is embedded in the metal before the cutting edge comes into action. This step of embedding the tool steadies it relatively to the work, and prevents it from sliding on the surface of the metal. Under the action of the press, the tool operates to cut out the metal leaving a hole with a clean cut and well defined periphery.

In using my invention on certain kinds of work I employ a center finder adapted to extend beyond the working surface of the tool or punch, said center finder being movable freely in an upward direction within the tool. Said tool has a bore or passage for the accommodation of the center finder, and the weight of said finder is augmented by the employment of means adapted to adjust the finder for varying the operative length thereof. Said means consists of one or more nuts screwed on a threaded upper part of the finder and adapted to move or play therewith relative to or within the tool or its holder.

The center finder projects normally beyond the working face of the tool in order that the pointed end of the finder may engage at the proper point with the work or sheet of metal for the purposes of centering the latter below the tool or punch. It should be explained that it is customary to rule or

score the work with crossing lines, at the intersections of which the center finder engages with the work so as to center the same below the punch. Said center finder on the descent of the tool slides upwardly into the tool, but as the latter is lifted from the work, the center finder drops by gravity for the purpose of exposing its working end beyond the punch.

10 In the drawings Figure 1 is a side elevation, partly in section, of a punching tool constructed in accordance with the invention; Figs. 2, 3 and 4 are a series of views representing the operation of punching a hole in a sheet of hard material; Fig. 5 is a vertical section through the punch and the holder therefor to show the position of the center finder therein; Fig. 6 is a detail view of the center finder removed from the tool.

20 As shown, the punch A comprises a body portion, *a*, provided with a forwardly projecting punching face, *b*, relative to the cutting edge *c*. The body is, preferably, circular in cross section, although this particular shape is not essential, and the cutting edge, *c*, is continuous. This cutting edge is back of, or above, the conical punching face, *b*, the latter being bounded by said edge *c*. The body, *a*, of the tool is enlarged as at *d* and flared at *e*, for the purpose of fitting the punch in the ring or gland B, by which the punch is coupled to the holder C. As shown, the gland B is adapted to be screwed to the holder C, for the purpose of attaching the punch removably to the holder, thus enabling the punch to be detached for the purpose of re-surfacing the face *b* and sharpening the cutting edge *c*. Punches of different sizes may be used interchangeably in the holder C for the purpose of punching holes of different diameters in the material or work.

In connection with the punch A, I prefer to use a center finder E, the latter being constructed as shown more particularly by Figs. 5 and 6. The holder C has a longitudinal bore or passage *f*, and the tool or punch A has a similar bore or passage *g*, the latter being in alinement with the passage *f*. The center finder fits loosely in the passage *f*, *g*, so as to be free to move or play therein lengthwise, the pointed end *h* of said finder being adapted to pass through the face *b* of the punch and to project beyond the punch A, as shown. The operative length of the center finder, adapted to be exposed beyond the face *b*, may be varied by adjusting, on the stem, a nut *i*, the latter being held in a determined adjusted position on said stem by a check nut *j*. The nuts *i*, *j*, are fitted loosely in the passage *f* of the holder C, and the nut *i* is adapted to rest, or be seated, on the upper end of the punch A, whereby the

finder and the nuts are free to move longitudinally within the punch and the holder. 65 The adjustment of the nuts on the center finder E enables it to be used with punches which vary in length. The nuts augment the weight of the center finder and cause it to move downward, quickly, by gravity in 70 the tool.

It will be understood that the holder C is secured in a power press, in order that the punch A may be operated by power. This punch operates in conjunction with a die or bed, indicated at F in Figs. 2, 3 and 4. Between said punch A and the die or bed F is fed or placed the work G in the form of a sheet or plate of hard material, such as metal. As the punch approaches the work, 80 the center finder E first engages at the proper point with the work, said finder being free to give or yield upwardly on the continued movement of the tool. The face or end *b* of the punch engages with the 85 metal in advance of the edge *c*, as indicated by Fig. 2, and as the punch continues its movement, said face is embedded in the work, see Fig. 3, whereby the punch is prevented from slipping or becoming displaced 90 on the work, being thus held firmly in its working position. The continued movement of the punch toward the die or bed brings the edge *c* into action for the purpose of cutting the metal from the sheet or plate, 95 and the punch is thus adapted to force its way through the metal, as indicated by Fig. 4. The result of this operation is that the hole is punched in the plate in a manner to leave smooth and uniform edges. 100

My new punch possesses remarkable durability, practical tests having demonstrated that as many as ten thousand holes can be punched in comparatively thick sheets of metal without re-sharpening the edge *c* of 105 the tool.

It is manifest that the punch is adapted for many uses, but it has proved to be of especial utility and value for punching structural iron and steel. 110

It will be observed, particularly from Fig. 5, that the body portion, *a*, of the punch, and the projecting punch face, *b*, unite to form the cutting edge, *c*, the said parts, *a* and *b*, coming together at an obtuse angle, thereby 115 greatly increasing the strength of said cutting edge.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is;— 120

1. A punch provided with a cutting edge and a substantially frusto-conical punching face beginning at said edge and extending forwardly thereof.

2. A cutting out punch provided with a 125 cutting edge formed by two surfaces meet-

ing at an obtuse angle, one of which surfaces extends forward from said cutting edge to form a punching face.

5 3. A punch provided with a cutting edge formed by two surfaces meeting at an obtuse angle, and a substantially frusto-conical punching face beginning at and extending forwardly of said cutting edge.

In testimony whereof I have signed my name to this specification in the presence of 10 two subscribing witnesses:

THOMAS McGRATH.

Witnesses:

JAS. H. GRIFFIN,
H. I. BERNHARD.