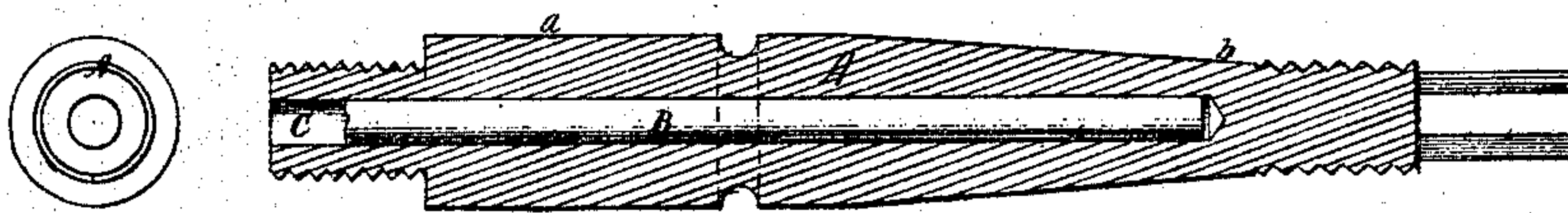
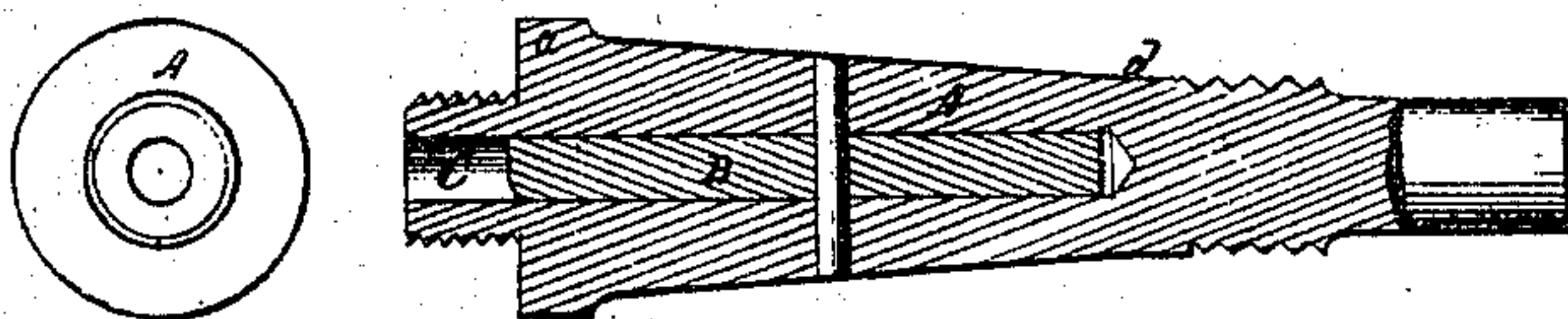


*J. L. Hall,*  
*Permutation Lock.*  
*No 105,800.                      Patented July 26. 1870.*

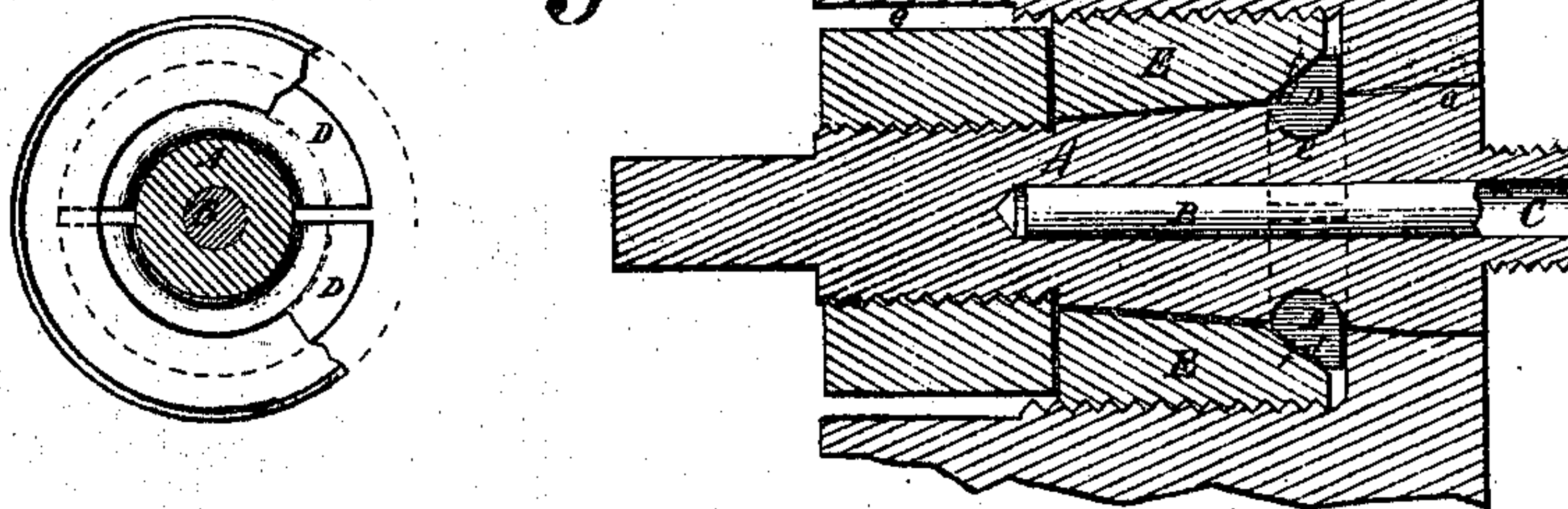
**Fig.1.**



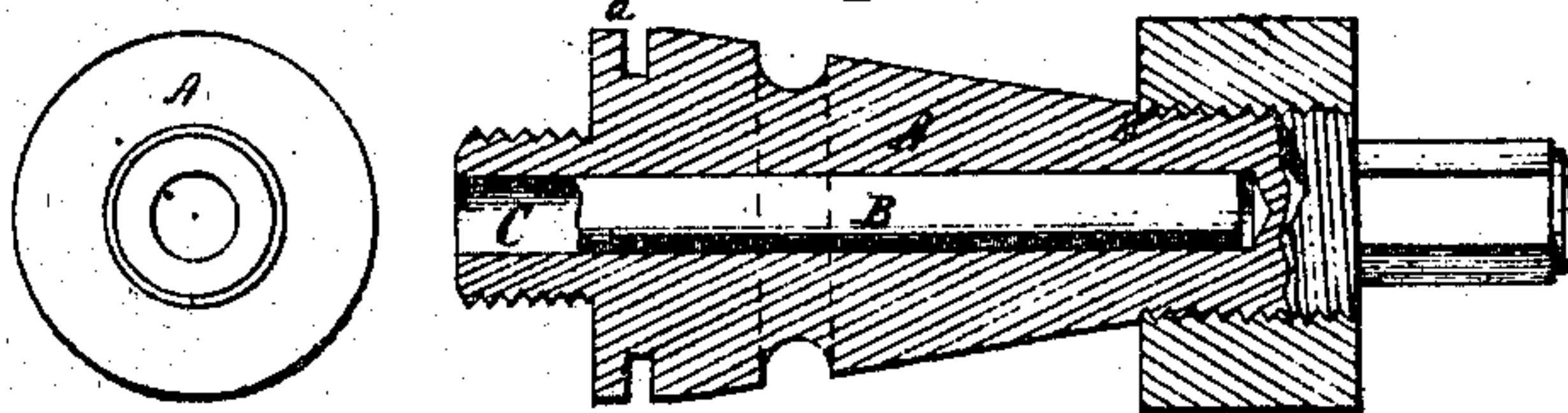
**Fig.2.**



**Fig.3.**



**Fig.4.**



*Witnesses:*

*C. L. Fisher*  
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*Inventor.*

*Joseph L. Hall*  
*J*



# United States Patent Office.

JOSEPH L. HALL, OF CINCINNATI, OHIO.

Letters Patent No. 105,800, dated July 26, 1870.

## IMPROVEMENT IN LOCK-SPINDLES.

The Schedule referred to in these Letters Patent and making part of the same.

I, JOSEPH L. HALL, of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain Improvements in Arbors for Operating Locks, of which the following is a specification.

My invention relates to an improved construction of arbors, and manner of securing them in the doors, casings, or bodies of safes, and consists in constructing the arbors with core-pieces of drill-proof metal, which are driven, riveted, keyed, screwed, or rusted in the longitudinal perforations made in the axes and through, or any desired length of the arbors, from their exterior toward their interior ends, for the purpose of preventing the drilling of the arbors, their removal and subsequent forcing off the locks, thereby exposing the contents of the safe, or otherwise secure receptacles.

Figure 1 is a longitudinal section and plan of the exterior end of an arbor embodying my invention.

Figures 2 and 4 are modifications of the same.

Figure 3 is a longitudinal section of an arbor, lock-nut, ring, and a portion of the safe-door, and also a transverse sectional elevation of the same.

A is the arbor; it is made of steel, or steel and iron welded together, that it can be made drill-proof; its large end *a* is cylindrical for a short part of the length, as exhibited in figs. 1 and 3, or flanged, as shown in figs. 2 and 4.

From the cylindrical end *a* to near the small and inner end *b* the arbor has a taper, more or less, according to its location.

B is the core-piece, located in the central and axial perforation C, in the arbor.

The diameter of this perforation is equal to about one-third of the diameter of the small end *b* of the arbor; in length the perforation may be nearly that of the arbor.

The core-piece B, after being tempered to resist the hardest tempered tools used in iron or steel working, is either screwed, keyed, riveted, rusted, or driven into the perforation C in the arbor, so that it cannot be removed.

In fig. 3 is exhibited a device for preventing the removal of the arbor, either by forcing it in or drawing it out, when a sufficient purchase has been obtained upon it by tapering into its exterior end, and applying force to accomplish that purpose.

An annular gutter or groove, *c*, is formed in the

large end *a* of the arbor; in this groove is fitted the two halves of the ring D; the mitered face *d* of this halved ring is presented toward the interior of the safe, and is not above the conical surface of the arbor.

The lock-nut E, passes freely about the arbor in the recess *e*, formed in the door of the safe, until its face *f* engages the corresponding face on the halved ring D and confines the said ring in its groove in the arbor, thus making it so that it can be readily removed from the inside of the door when the door is opened.

Since the ring D, in the groove of the arbor, is in contact on its front face with the one or more thicknesses of metallic plates, and its miter face is in contact with the nut E, which is screwed into the recess edges of the interior plates of the door of the safe, the arbor is firmly locked in place.

It has been found to be difficult, if not impossible, to impart the requisite degree of toughness to the inner or central particle of the steel arbors, that their surfaces acquire in the process of tempering, to successfully resist the drill which is used to remove the bulk of the arbor down to the small end of the conical surface thereof, in order that, by force otherwise inadequate, the lock may be forced off the door of the safe, and the contents of the receptacle of valuables fully exposed.

By introducing into the heart of the arbors a hardened core-piece that can neither be removed or "drilled out," the arbors will be secure, and neither the lock forced or blown off.

I claim as my invention—

1. The hardened core-pieces B, secured in the central parts of arbors, for operating locks for the purpose of preventing drilling through the center of said arbors, when the same are used upon burglar-proof safes or other secure receptacles, substantially in the manner herein shown and described.

2. The arbor or spindle A, provided with a recess or shoulder, and having a split ring D, fitted therein, and held in place by a nut, E, for the purpose of fastening the arbor in its seat, substantially as described.

JOSEPH L. HALL.

Witnesses:

C. L. FISHER,  
H. GROSS.