

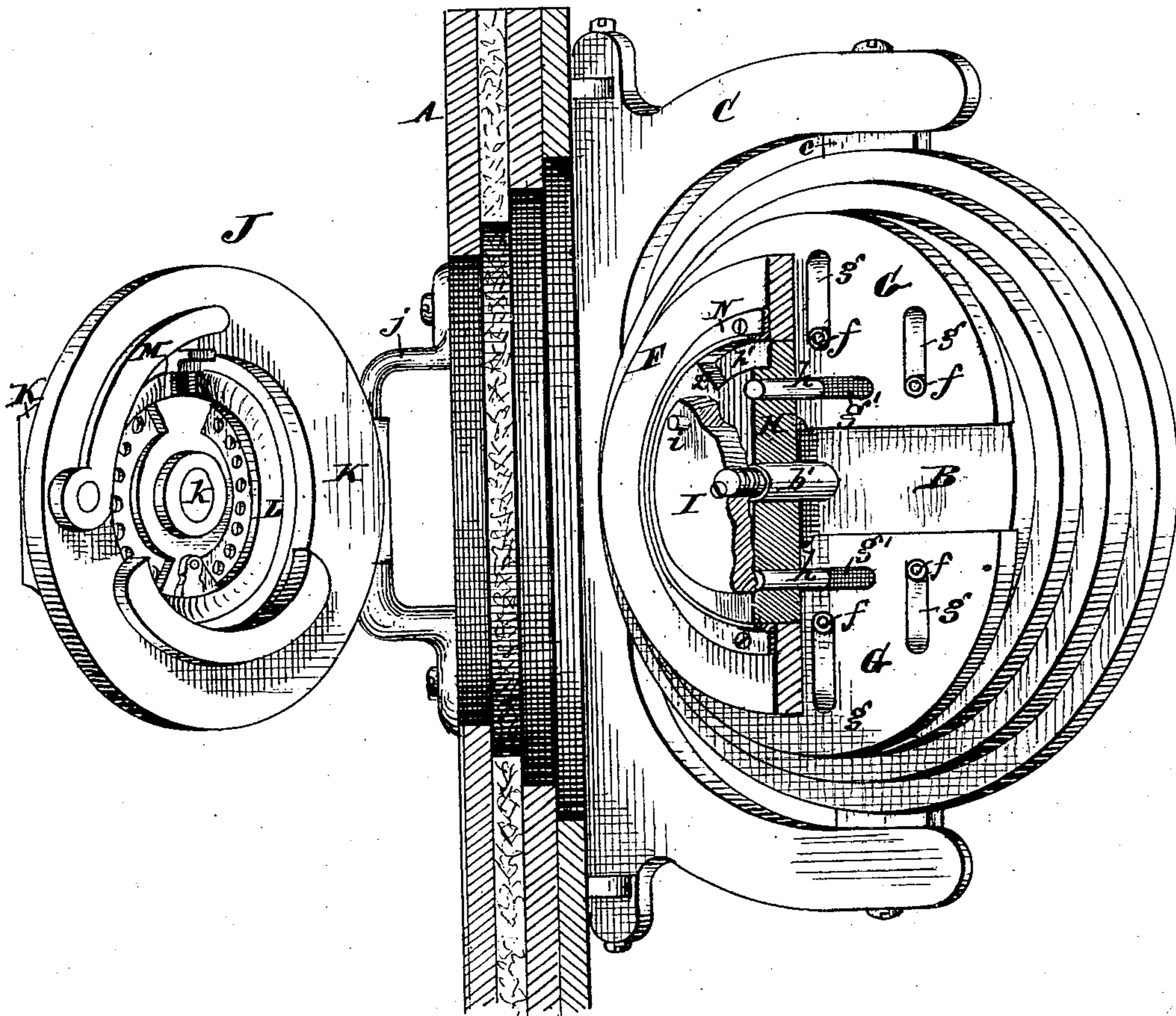
H. GROSS.

Permutation-Lock for Safe-Doors.

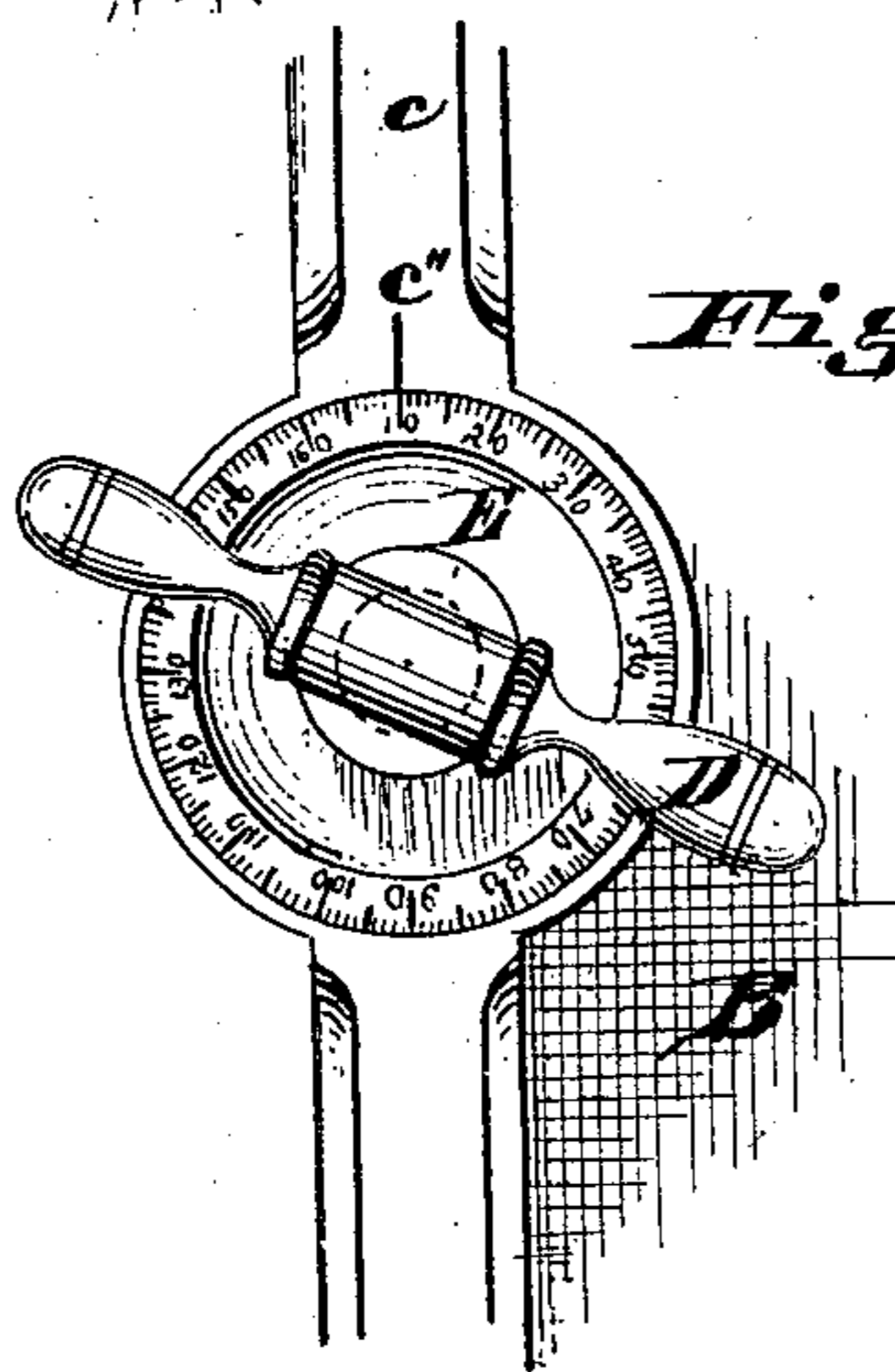
No. 164,167.

Patented June 8, 1875.

*Fig. 1*



*Fig. 2*



*Attest*  
*Edw. M. Baker*  
*Notary Public*

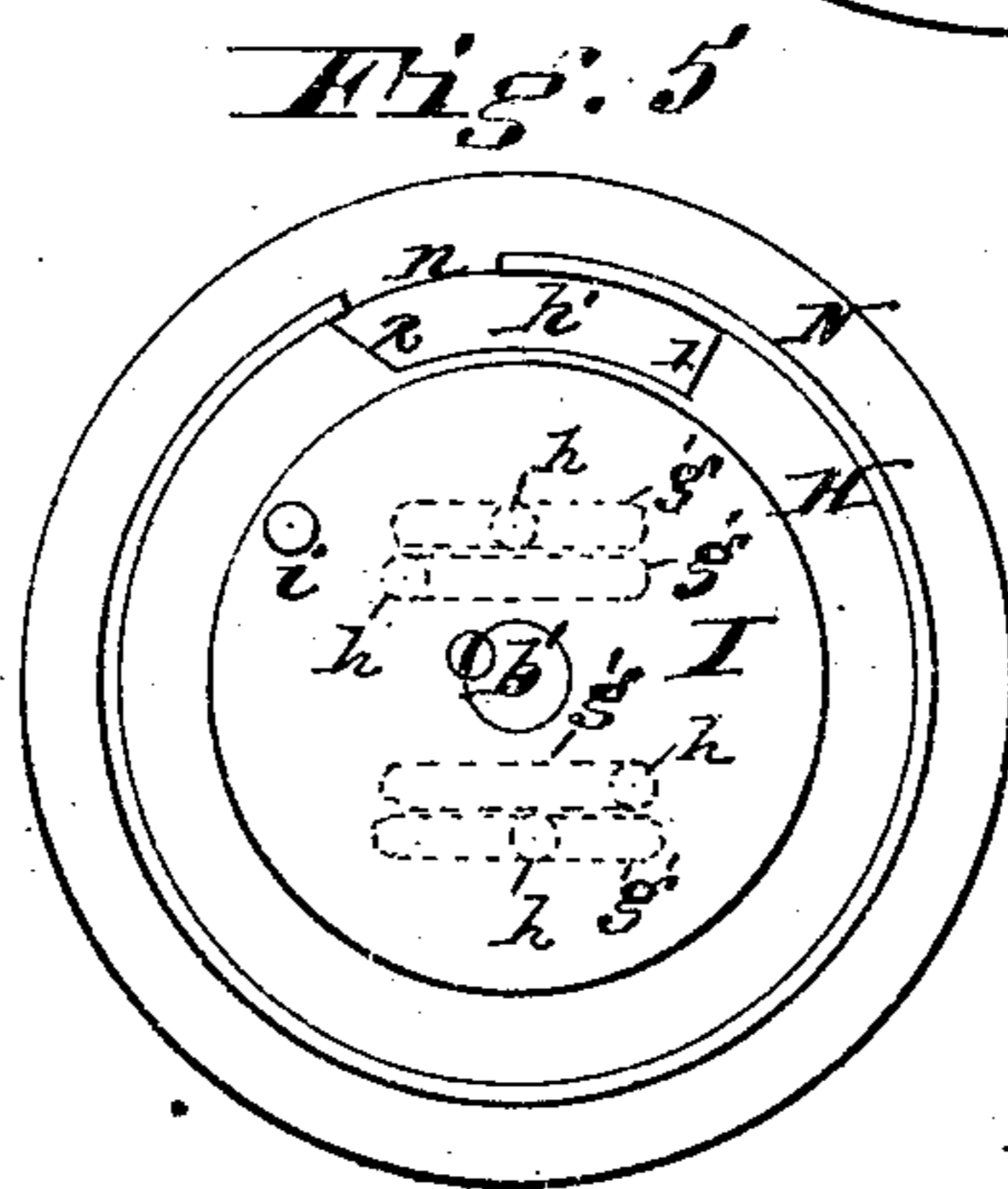
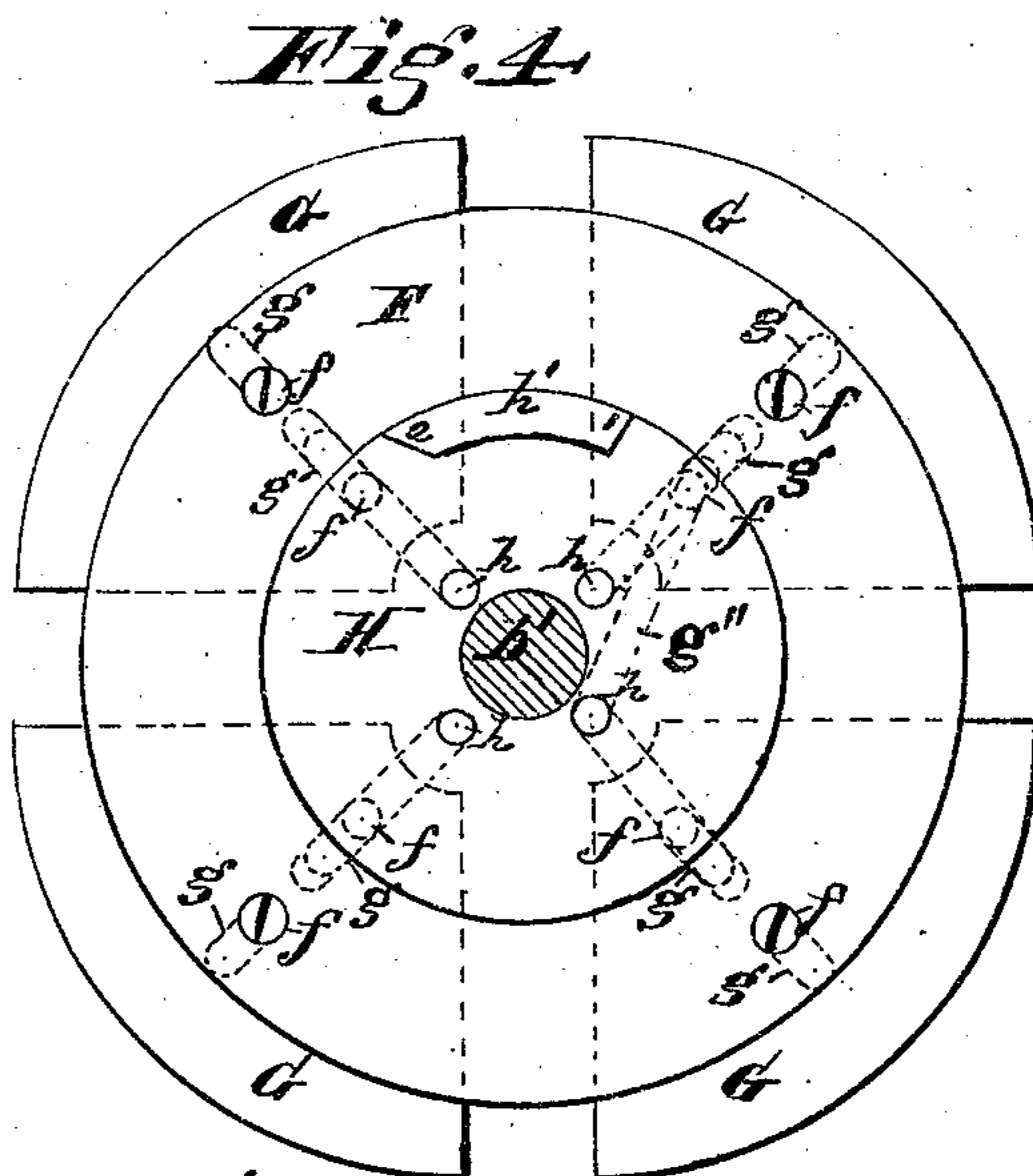
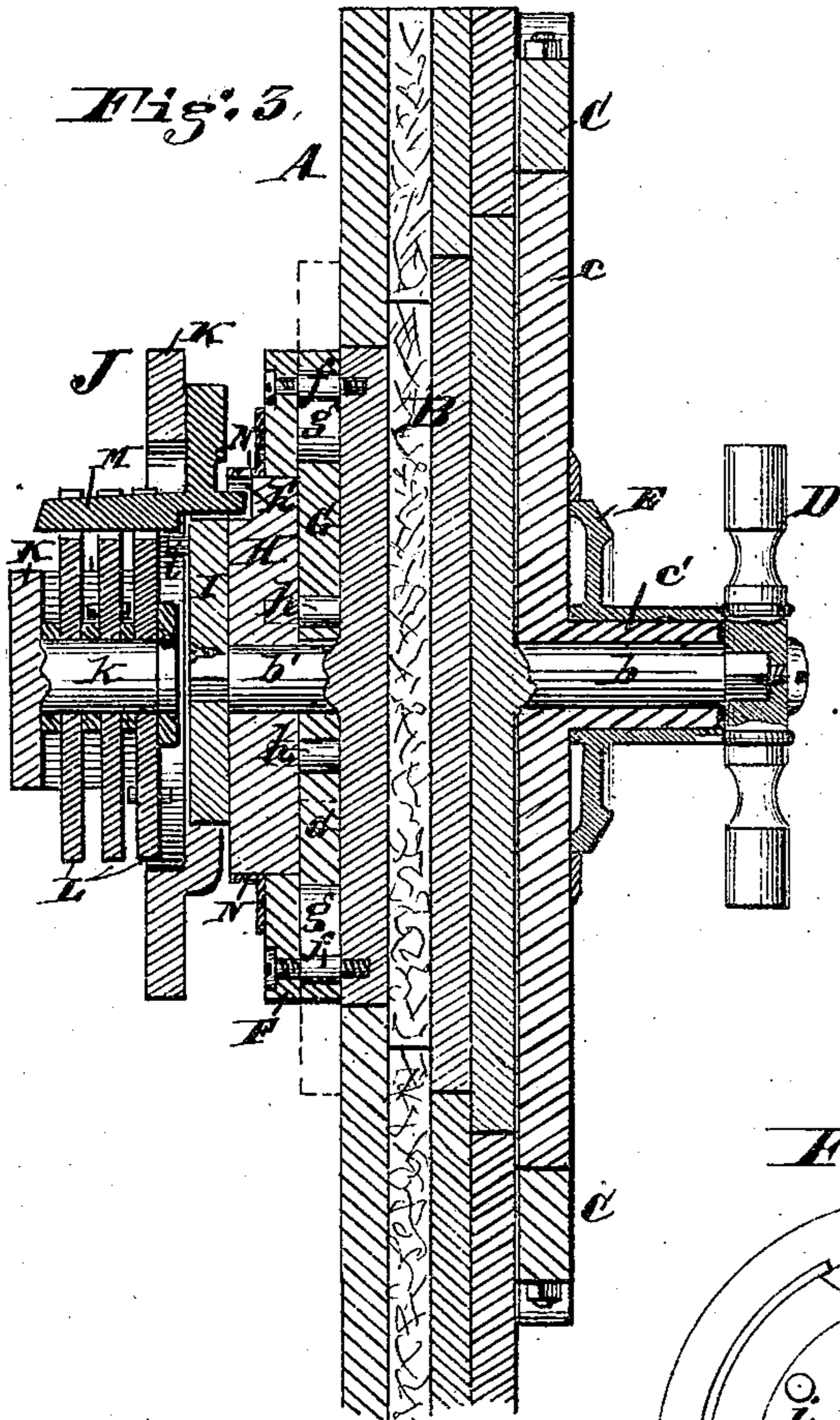
*Inventor*  
*Henry Gross*  
*By Edgar J. Gross*  
*Attorney*

H. GROSS.

Permutation-Lock for Safe-Doors.

No. 164,167.

Patented June 8, 1875.



*Attest*  
*Wm. Metcalfe*  
*W. Metcalfe*

*Inventor.*  
*Henry Gross*  
*By Edgar J. Gross*  
*Attorney*

# UNITED STATES PATENT OFFICE.

HENRY GROSS, OF CINCINNATI, OHIO.

## IMPROVEMENT IN PERMUTATION-LOCKS FOR SAFE-DOORS.

Specification forming part of Letters Patent No. **164,167**, dated June 8, 1875; application filed November 5, 1874.

*To all whom it may concern:*

Be it known that I, HENRY GROSS, of Cincinnati, Hamilton county, State of Ohio, have invented certain new and useful Improvements in Safe-Receptacles for Valuables, of which the following is a specification:

The main object of my invention is to construct the door so that it shall be as invulnerable as any other part of the safe; and consists, for this purpose, of a peculiar construction of said door, whereby it will, when moving in revolutions or parts of revolutions, operate the bolt-work, lock, or other fastening devices. My invention further consists of the combination of devices comprising revolving door, radiating bolt-work and crank-wheel, lock-dog or angle-bar, drive-wheel, and tumblers of a stationary lock, all operating in the simplest manner to make a strong and efficient lock-up.

Figure 1 is a sectional perspective view of my invention, showing lock and door swung back, with the bolt-frame, &c., broken in section. Fig. 2 is an elevation of the bearing-dial handle and a portion of the hinge of the door. Fig. 3 is a transverse section through perpendicular diameter of door. Fig. 4 shows a modified form of bolt-work. Fig. 5 is an elevation of drive and crank wheels, which respectively operate lock and bolt-work.

A is the front wall of a safe, composed of three layers of iron and one of steel, all stepped off at the jamb, as shown, to coincide with a correspondingly-stepped door, B. The jamb is perfectly circular to admit of the revolving, when in place, of said door B, which is also circular. The door has formed upon its face a stud, *b*, which rests in a bearing, *c'*, of a swiveling upright, *c*, attached to the jawed hinge C. Upon this bearing the door hangs, and revolves when operated by handle D, attached to the end of stud *b*. There is also secured to this handle D a dial, E, for registering the revolutions and parts of revolutions of the door B while passing a given point, *c''*, on the upright *c*. As shown in Fig. 3, the door B has no arbor, spindle, or holes for them through it, and is consequently constructed and hung as shown, to answer the purposes of such discarded means for operating the lock and bolt-work of the safe. These aforesaid arbors or spindles have been discarded

because requiring, as they all do, holes through the door, which they cannot close as firmly as the plates of the door itself. F is the bolt-frame, being a circular ring of metal, secured to the inner surface of the door in a suspended position by means of screws and thimbles *f*. Between it and the door I introduce a system of flat bolt-work, consisting of a circular piece of metal, same size or smaller than the bolt-frame, cut into sections G, of halves, quarters, or any desirable size and number, and secured by and sliding upon the thimble screws *f* by means of radially or otherwise cut slots *g*.

To operate these bolts uniformly and conveniently I secure loosely upon the stud *b'* a crank-wheel, H, having crank-pins *h*, to engage directly in cross-slots *g'* in the bolts, or to crank-arms *g''*, as shown by dotted lines, Fig. 4. In either case any change in the relative positions of door B and crank-wheel H will operate the bolts in or out radially from the center, Fig. 4 showing them out or in a locked position, and Fig. 1 closed or inside the frame F. The crank-wheel H is formed with a segmental recess, *h'*, on its outer edge, by which it is operated, one of its boundaries, 1, being radial to the circumference, and the other, 2, tangential. This wheel is surrounded by a rim of metal, N, attached to the bolt-frame F, and formed with a notch, *n*, on its upper side, which notch is the only means of perpendicular access to said recess *h'*, side access being had along its full length. Secured fixedly to the stud *b'* is a drive-wheel, I, having a projection, *i*, to engage with or act upon a similar projection upon the first tumbler of a lock, J, hung independent of the door B upon hinge *j*, attached to the inner side of wall A. The lock consists of the frame K, fitted with stud *k*, tumblers L of any desired pattern to rest upon said stud, and a dog or angle-bar, M, to form a connection between the action of said tumblers and the crank-wheel H of the bolts G. When the safe is in a locked condition, the lock J hangs fixedly parallel with the wall A, the notches of tumblers L out of line, and the dog M resting upon the rim N of the bolt-frame F. At the same time the bolts G are thrown out, as shown in Figs. 1 and 4, or Figs. 3 and 5, in dotted lines, and secure the door perfectly

against entrance to the safe. Now, to unlock the safe, the door is revolved, (carrying with it the bolt-work,) to set by the dial E, through the action of drive-wheel I *i*, the combination necessary to bring the notches of the tumblers L into line directly beneath dog M. When the last tumbler is brought into line in the usual manner of reverse turning, the motion of the door is reversed until the notch *n* of the rim N passes over the recess *h'* and under the dog M, when, as its support is taken away, the dog drops into the recess *h'* and notches of tumblers L, and by continuing the revolution of the door the stationary dog M stops the motion of the revolving crank-wheel H by pressing against end 1, and changes the relative positions of said wheel H and door B, the results of which, as before said, and as are obvious, being an operation closing or drawing in the bolts G. The door in this condition is easily swung open. Now, if the door, after being closed, be revolved in the opposite direction from that by which it was unlocked, the dog M will arrest the progress of the crank-wheel H by pressing against the tangential boundary 2 of the recess *h'*, and as it would not retain this po-

sition unless guarded by rim N, immediately the notch *n* is reached, it is forced out, leaving the notches of the tumblers L at the same time. By now continuing the motion of the door until the drive-wheel I moves the tumblers L sufficient to disarrange the notches, the bolts G cannot again be thrown until these said notches are again brought in line, which requires a new operation.

I claim as follows:

1. The door B, moving in revolutions or parts of revolutions, to operate the lock and bolt-work of the safe, substantially in the manner and for the purpose specified.

2. The combination of the rotating door B, bolt-work G F N, and crank-wheel H, lock-dog M, drive-wheel I, and tumblers L of a stationary lock, J, constructed, connected, and operating substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand this 31st day of October, 1874.

HENRY GROSS.

Witnesses:

EDGAR J. GROSS,  
HENRY METCALEE.