No. 698,112. Patented Apr. 22, 1902.

J. HALL.

FRICTION CLUTCH.

(Application filed Sept. 10, 1901.)

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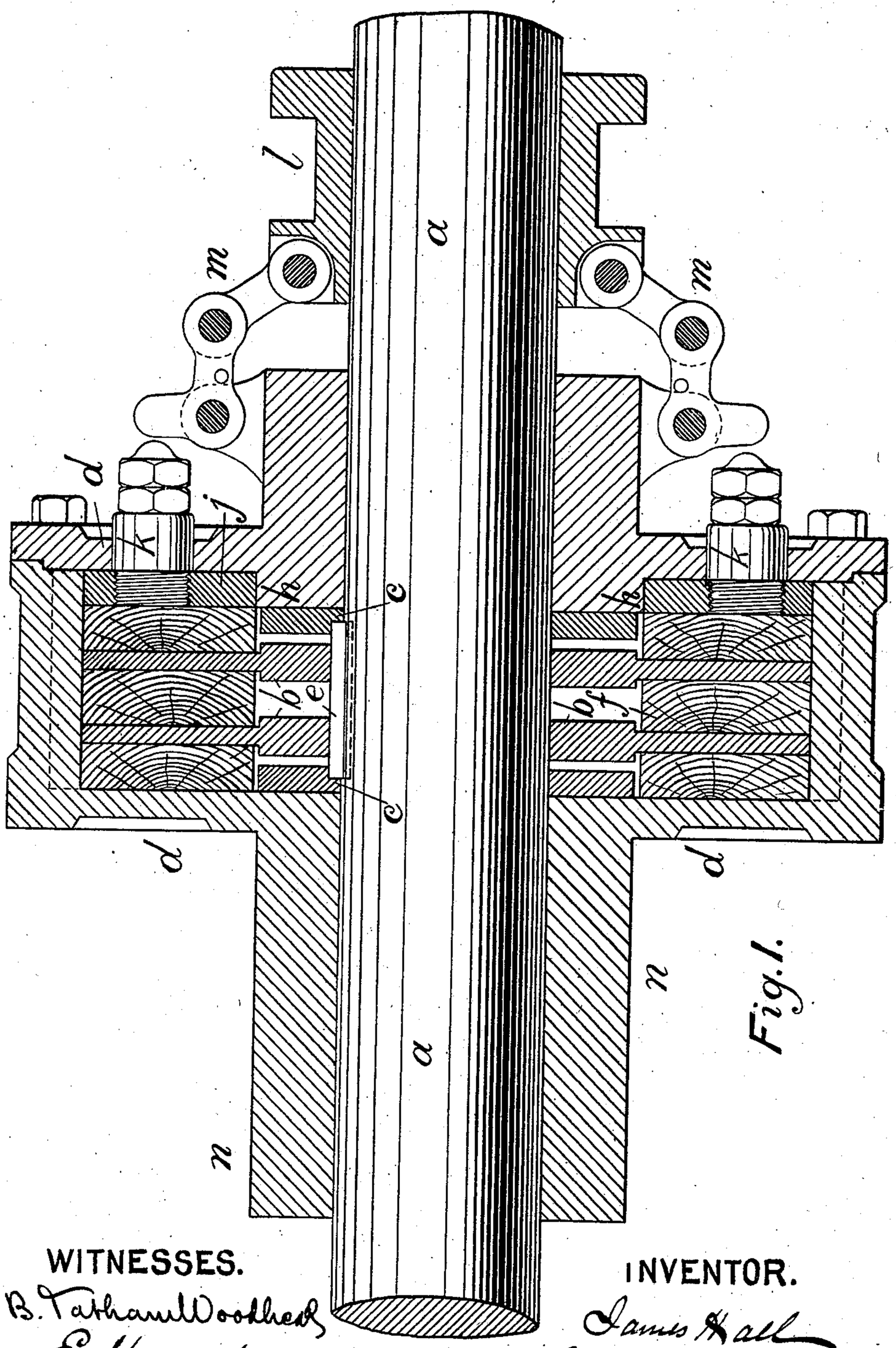

Fig. 1.

WITNESSES.

B. Tatham Woodhead

E. Howard.

INVENTOR.

James Hall

by Downes O'Brien

atty.

No. 698,112. Patented Apr. 22, 1902.

J. HALL.

FRICTION CLUTCH.

(Application filed Sept. 10, 1901.)

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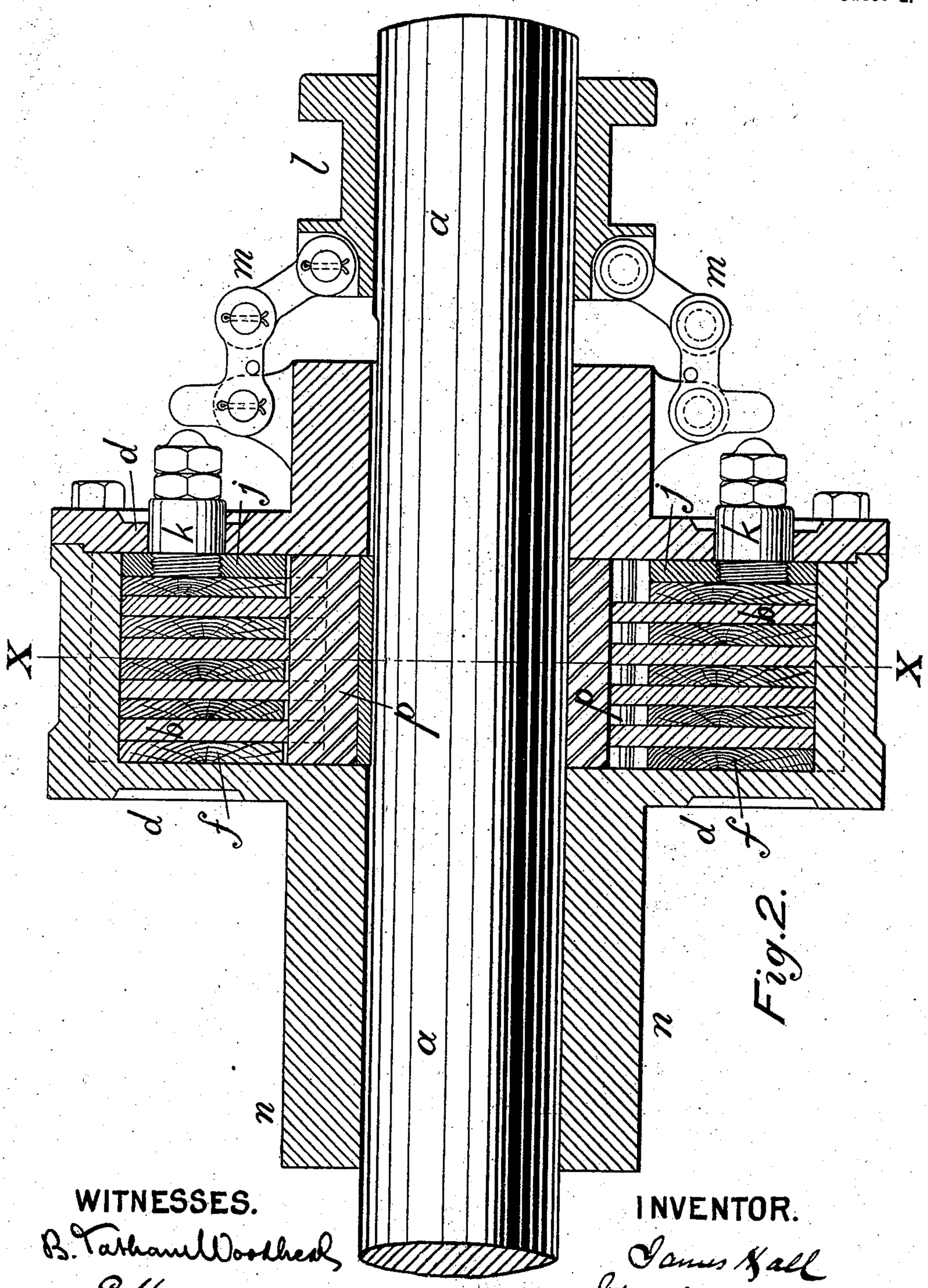

Fig. 2.

WITNESSES.

B. Tatham Woodhead

E. Howard.

INVENTOR.

James Hall

by Dowsens O'Brien

atty

No. 698,112. Patented Apr. 22, 1902.

J. HALL.

FRICTION CLUTCH.

(Application filed Sept. 10, 1901.)

(No Model.) 7 Sheets—Sheet 3.

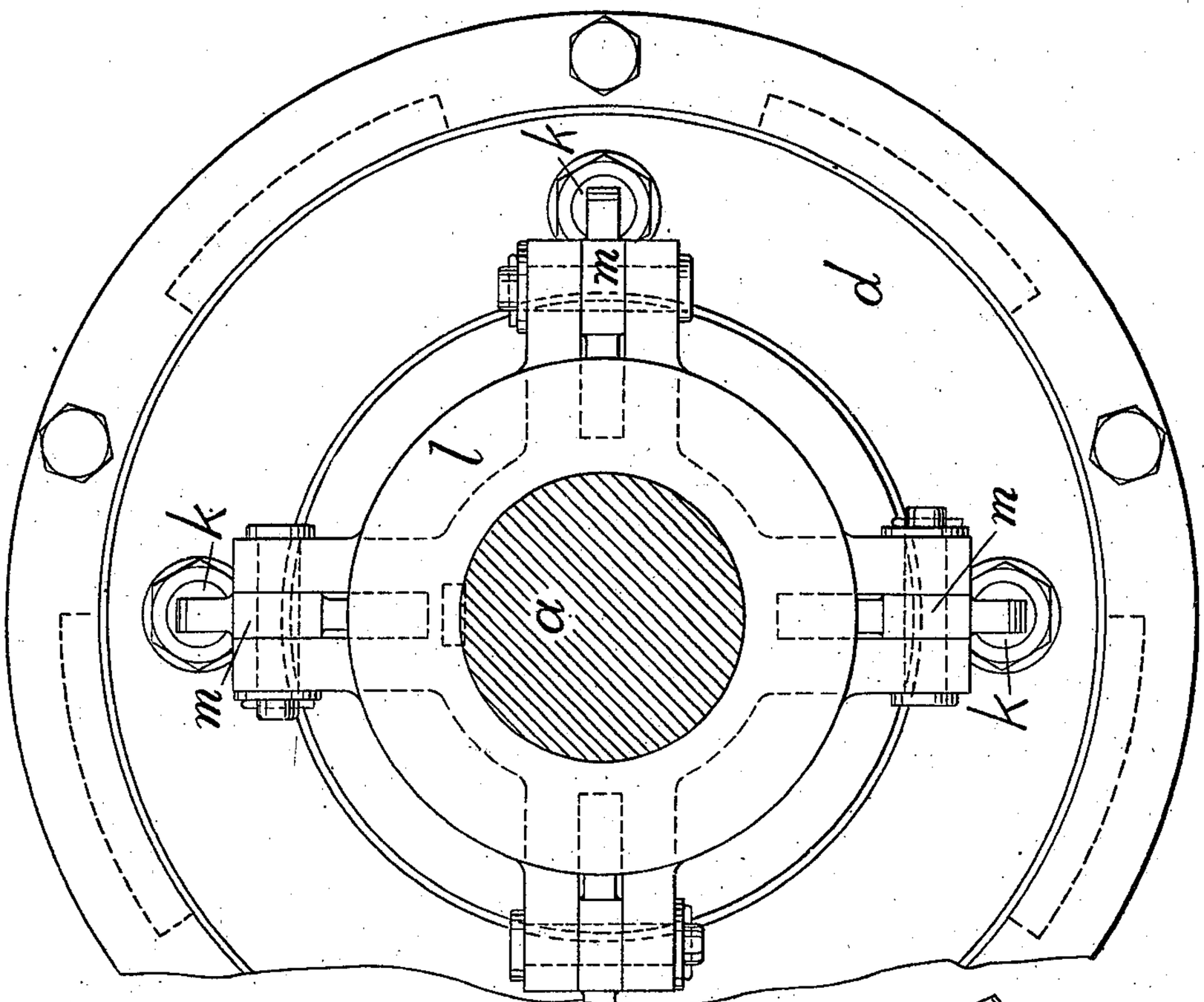

Fig. 3.

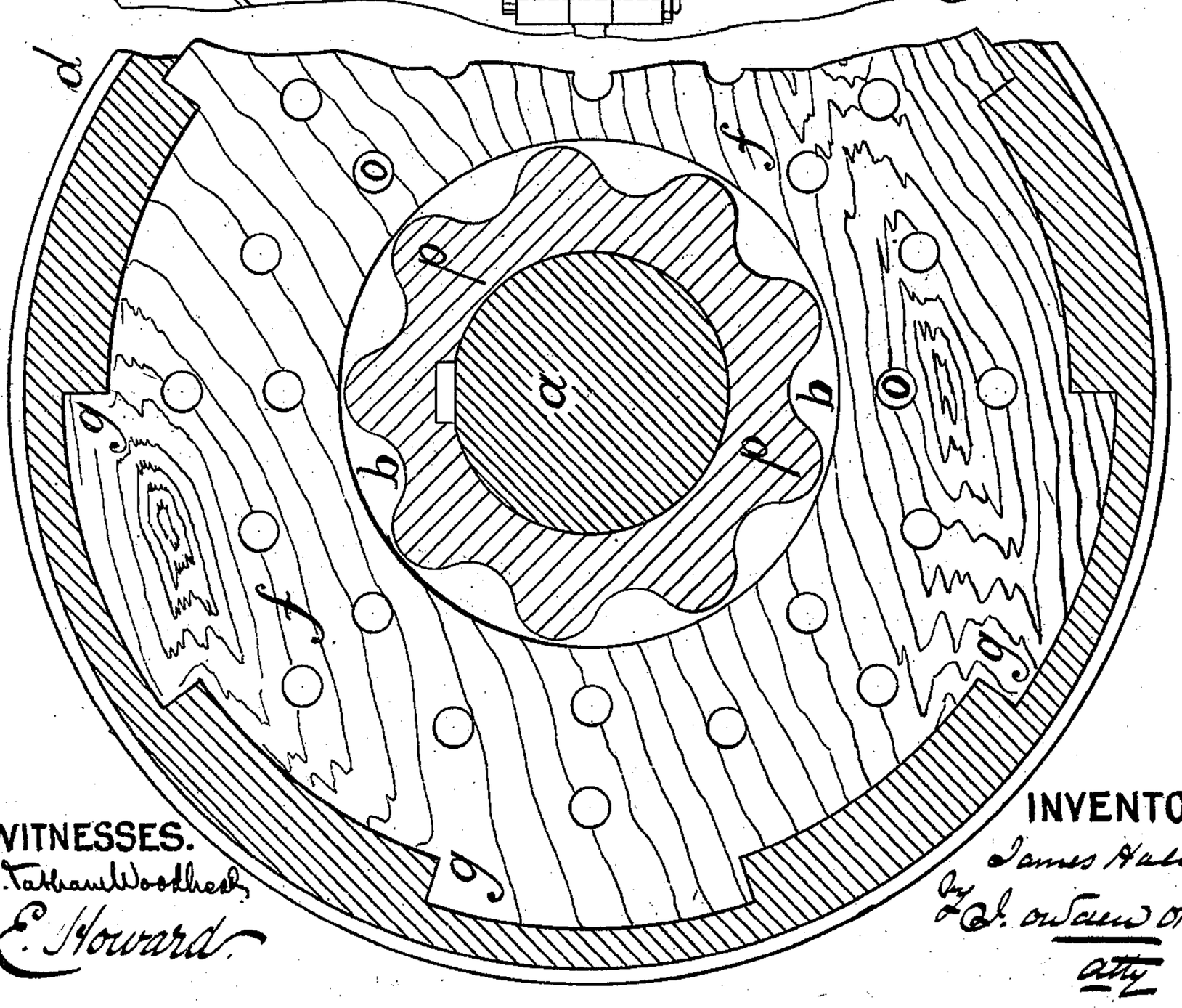

Fig. 4.

WITNESSES.
B. Tatham Woodhead
E. Howard.

INVENTOR.
James Hall
by Chas. Owen O'Brien
Atty

No. 698,112. Patented Apr. 22, 1902.

J. HALL.

FRICTION CLUTCH.

(Application filed Sept. 10, 1901.)

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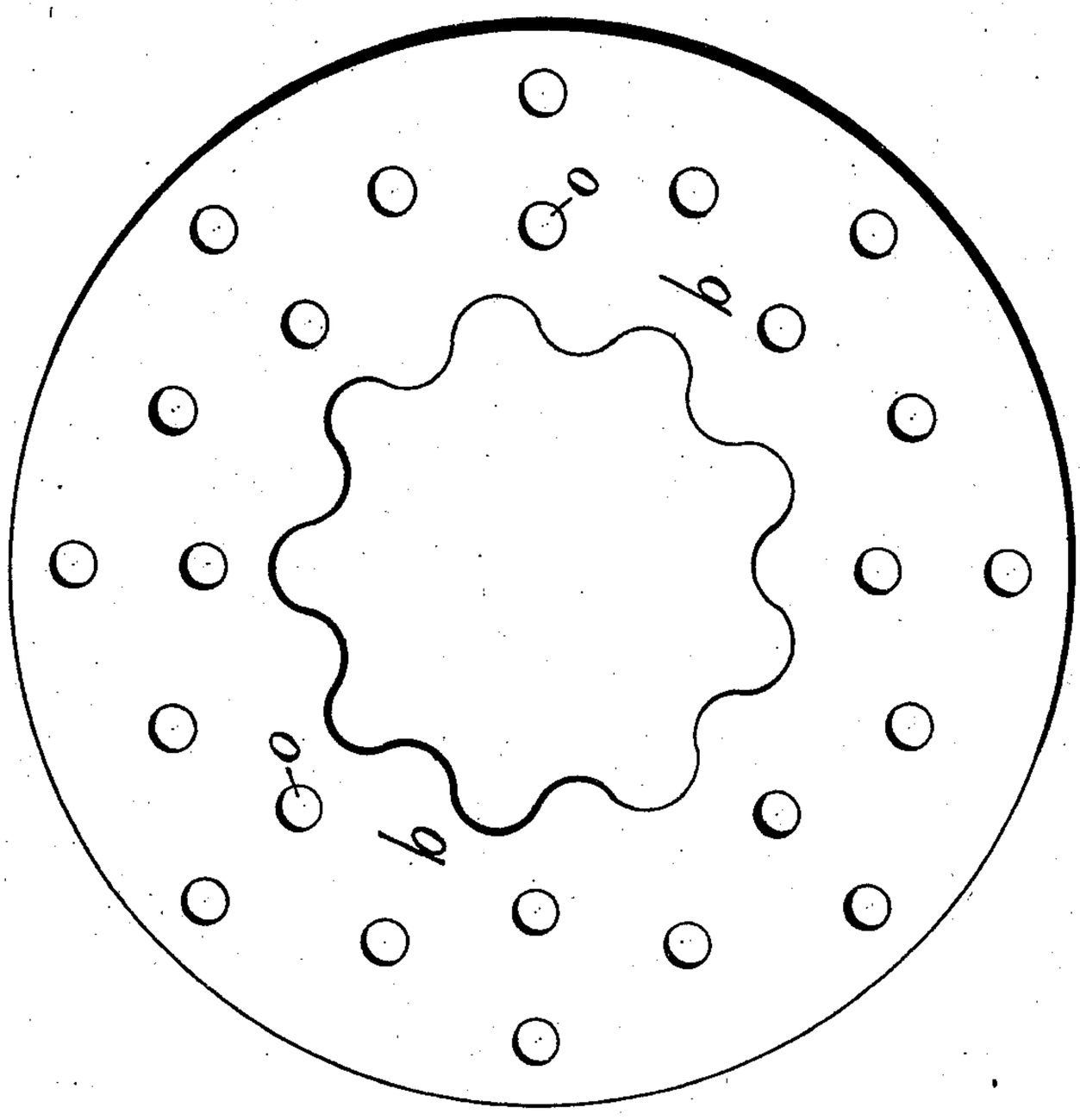

Fig. 6.

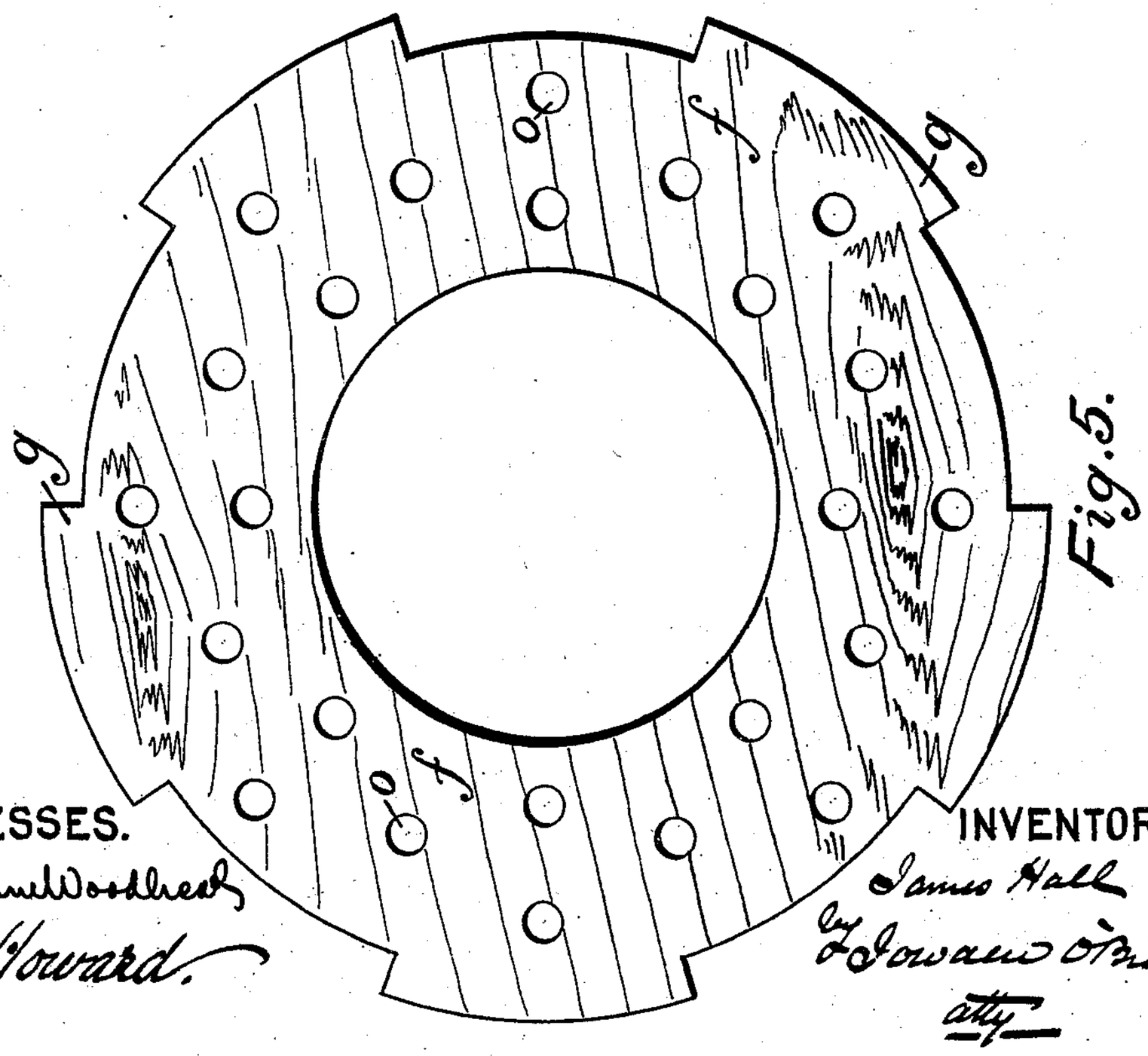

Fig. 5.

WITNESSES.

B. Tatham Woodbridge

E. Howard.

INVENTOR.

James Hall

by Edwards O'Brien

atty

No. 698,112. Patented Apr. 22, 1902.

J. HALL.

FRICTION CLUTCH.

(Application filed Sept. 10, 1901.)

(No Model.) 7 Sheets—Sheet 5.

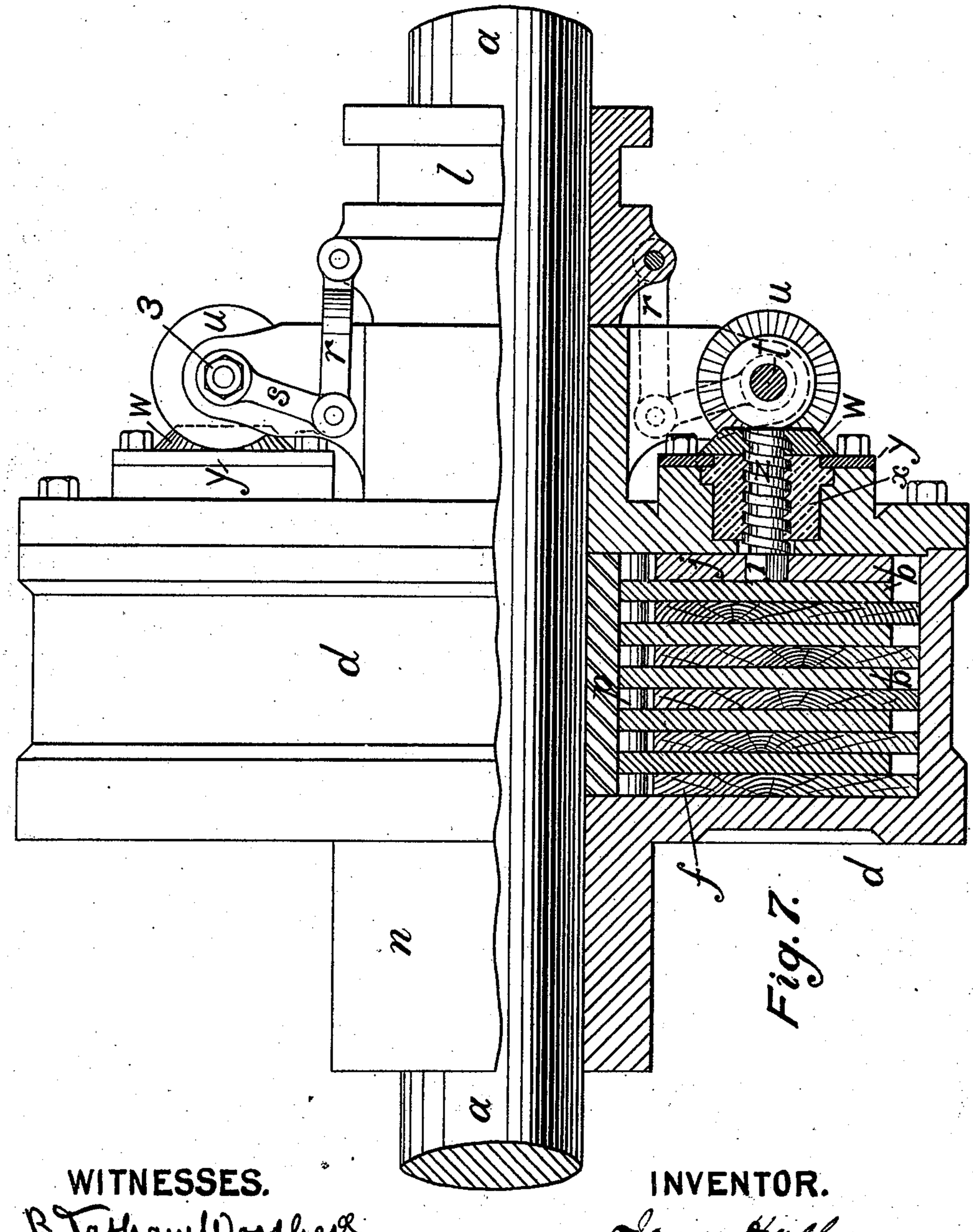

Fig. 7.

WITNESSES.

B. Tabham Woodhead

E. Howard.

INVENTOR.

James Hall

By D. O'Brien O'Brien

atty

No. 698,112. Patented Apr. 22, 1902.

J. HALL.

FRICTION CLUTCH.

(Application filed Sept. 10, 1901.)

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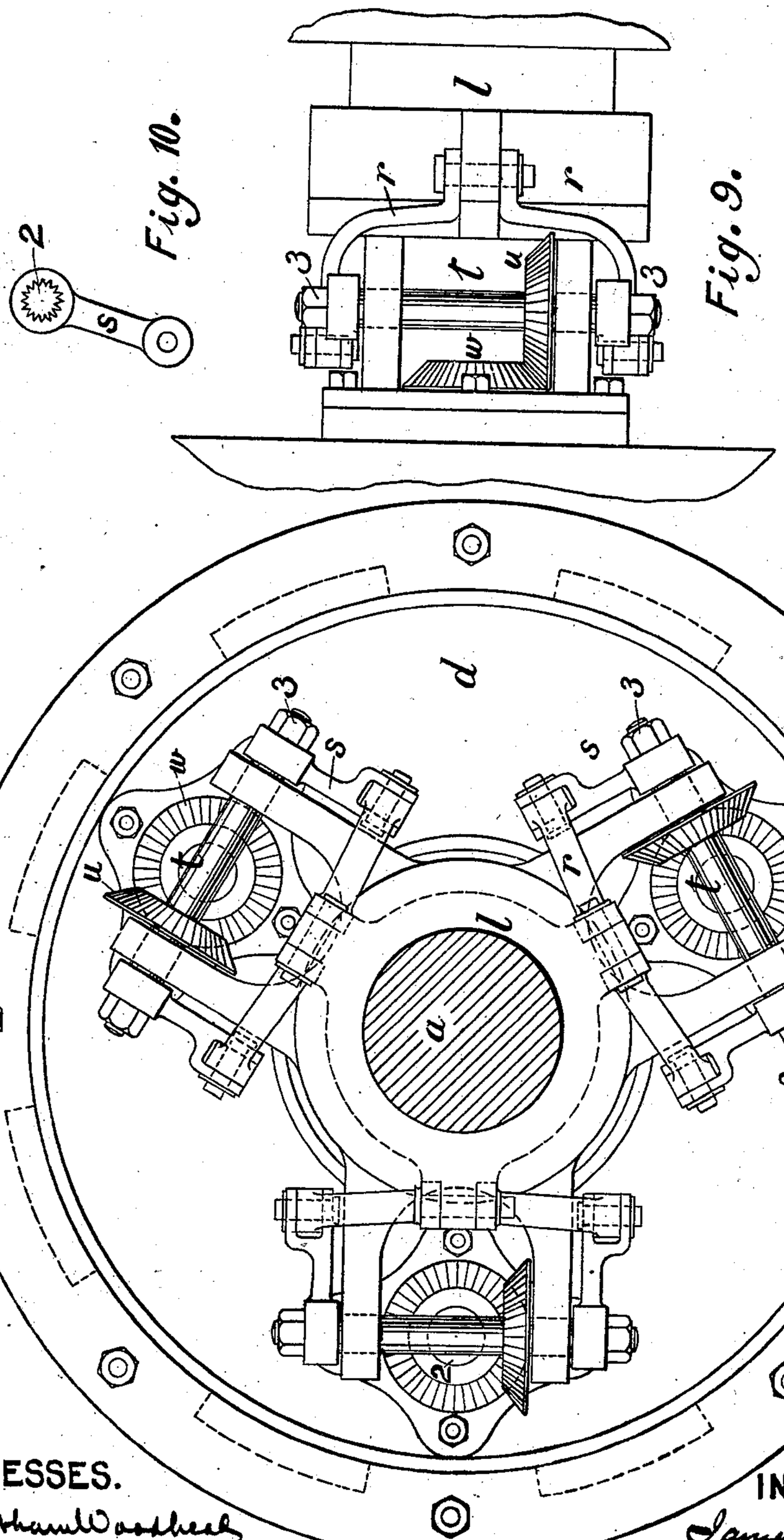

Fig. 10.

Fig. 9.

Fig. 8.

WITNESSES.

B. Tabham Woodbridge

E. Howard.

INVENTOR

James Hall

by Thomas O'Brien

atty.

No. 698,112. Patented Apr. 22, 1902.

J. HALL.

FRICTION CLUTCH.

(Application filed Sept. 10, 1901.)

(No Model.) 7 Sheets—Sheet 7.

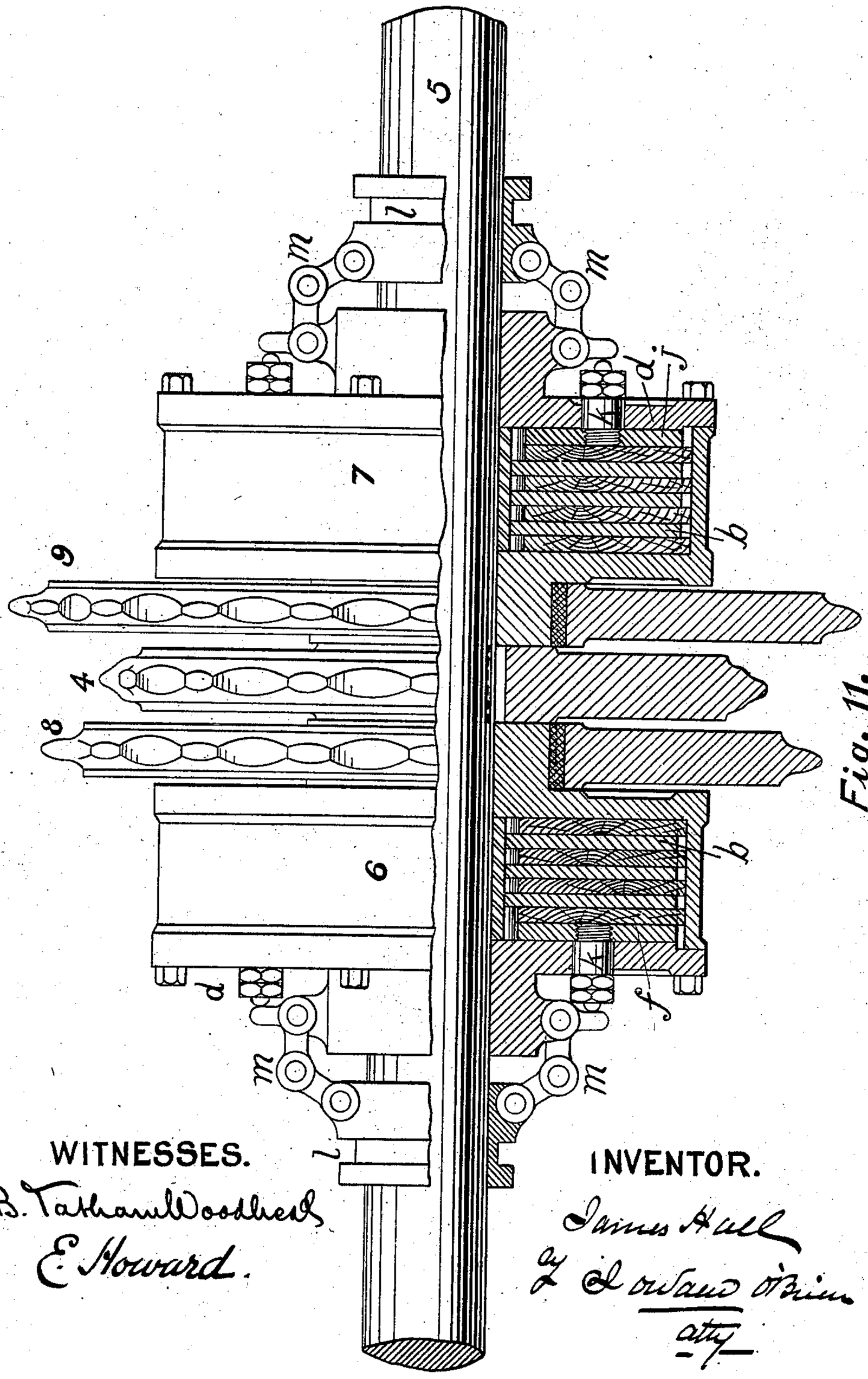

Fig. 11.

WITNESSES.

B. Tatham Woodhead

E. Howard.

INVENTOR.

James Hall

by Lawson O'Brien

atty

UNITED STATES PATENT OFFICE.

JAMES HALL, OF RADCLIFFE, ENGLAND.

FRICTION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 698,112, dated April 22, 1902.

Application filed September 10, 1901. Serial No. 74,947. (No model.)

To all whom it may concern:

Be it known that I, JAMES HALL, engineer, a British subject, and a resident of Radcliffe, in the county of Lancaster, England, have invented certain new and useful Improvements in Friction-Clutches, of which the following is a specification.

This invention relates to friction-clutches, and is designed to materially increase the efficiency and at the same time reduce the size of such apparatus.

In clutches as at present generally constructed power is transmitted by means of pressure exerted on either the inside or outside of a flange, and such clutches as they wear lose their power of grip and efficiency. With this invention, on the other hand, the friction-surface and the efficiency increase as the clutch is used.

The invention will be described with reference to the accompanying drawings.

Figure 1 is a transverse section of one form of the clutch; Fig. 2, a transverse section of another form of clutch constructed to transmit medium powers; Fig. 3, a side elevation of same; Fig. 4, a section on line X X, Fig. 2; Figs. 5 and 6, details showing alternate friction-disks used in clutch; Fig. 7, a front elevation, partly in section, showing clutch as constructed to transmit large powers; Fig. 8, a side elevation of same; Figs. 9 and 10, details of mechanism for throwing the disks into friction contact; Fig. 11, an elevation, partly in section, showing the clutch applied to a motor-vehicle.

Upon the shaft *a* are fitted a number of metallic disks *b*, capable of sliding longitudinally of the shaft, but locked to it by a key-corrugated sleeve or otherwise to rotate with it, also a number of friction-disks *f*, placed between the metallic disks *b*, loose on the shaft *a* and free to move longitudinally and rotate thereon. Incasing the disks *b* and *f* is a sheath *d*, loose on the shaft to rotate thereon, but without longitudinal movement internally. The sheath *d* is locked to the friction-disks *f*, so that both rotate together, while the disks are capable of being moved longitudinally inside the sheath. Referring to Fig. 1 of the drawings, the disks *b* are shown locked to the shaft *a* by means of a feather-key *e*, having at either end collars or washers *c*, recessed to take the ends of the feather-key *e*, so that when the shaft rotates the collars will rotate with it. These collars are provided to prevent lateral movement of the clutch, the sheath *d* of which is mounted loose upon the shaft *a*, with its sides against the said collars *c*. The sheath is preferably made solid to maintain the clutch dust-proof; but this is not necessary where lightness is specially required. In Figs. 2, 3, 4, 7, 8, and 11 the disks *b* are shown locked to the shaft *a* by means of a solid sleeve or boss *p*, firmly keyed to the shaft *a* and having a grooved or fluted surface, the disks *b* (see Fig. 6) being formed with a corresponding central opening, so as to engage therewith. The sleeve *p* also prevents any longitudinal motion of the sheath *d*. The friction-disks *f* (see Fig. 5) are locked to and caused to rotate with the sheath *d* by projections *g*, formed on their periphery, which enter and engage similar recesses formed in the interior circumference of the sheath. Both series of disks *b* and *f* are preferably made with perforations *o* to allow of the free passage of air.

For exerting the necessary pressure upon the disks to throw them into frictional contact a ring *j* is provided capable of longitudinal motion in the sheath, to which are attached adjustable studs *k*, projecting outward through holes formed in the sheath. When these adjustable studs *k* are pressed up from outside, the disks *b* and *f* and the side of the sheath *d* are pressed into contact against one another, and any rotary movement imparted to the sheath *d* is transmitted through the disks *f* and the disks *b* by their frictional contact to the shaft *a*, or vice versa. Pressure may be exerted on the adjustable studs *k* by any suitable mechanical means. The drawings show a sliding sleeve *l*, which may be actuated by a lever in the usual way, the lateral motion of which actuates a system of levers *m* to press against the adjustable studs *k*.

When large powers are to be transmitted, a more certain and powerful method of striking the friction-contact between the disks is required, and for this purpose the mechanism shown in Figs. 7 to 10 has been designed. To the sliding sleeve *l* is pivoted a connecting-

rod *r*, which actuates a lever or crank *s*, keyed or otherwise attached to the spindle *t*. Upon the spindle *t* is mounted a bevel-wheel *u*, gearing with a second bevel-wheel *w*, securely attached to or made in one piece with the nut *x* and held in position by the washer *y*. As the nut *x* is rotated, the screw *z*, passing through it, which is prevented from rotating by means of the square head 1 fitting into a similar-shaped hole in the ring *j*, is caused to move inward or outward, as the case may be, to throw the clutch into or out of gear. The levers *s* instead of being keyed to the spindle *t* may be formed with internal teeth 2, engaging corresponding teeth formed on the ends of the spindle, so that should any wear take place in the clutch it will only be necessary to unscrew the nuts 3 and move the levers on two or three teeth to overtake any such wear. The sleeve *n*, cast with the sheath is provided to carry a pulley gear-wheel or the like for transmitting power to or from the clutch, or these may be mounted on the circumference of the clutch itself.

In Fig. 11 the clutch is shown applied to a motor-vehicle to form a two-speed gear. The chain-wheel 4 conveys the power to the counter-shaft 5, upon which are mounted two of the clutches, one of which, 6, carries the low-gear wheel 8, and the other, 7, carries the high-gear wheel 9.

The clutch can be used as a coupling if the shaft is in two parts.

What I claim as my invention, and desire to protect by Letters Patent, is—

In a friction clutch or coupling the combination with the shaft *a* and sheath *d* loose thereon of the fluted hub *p* firmly keyed to the shaft *a;* the disks *b* formed with correspondingly-grooved central openings to slide longitudinally thereon: the friction-disks *f* with projections *g* to engage corresponding recesses in the sheath *d* and arranged alternately with the disks *b* the ring *j;* the screw *z* to force the ring *j* against the disks *b* and *f* to bring them into frictional contact, the bevel-wheel *w* and nut *x* to reciprocate the screw *z* the collar *y* to secure them in position the spindle *t* and bevel-wheel *u* to gear with the bevel-wheel *w*, the levers *s* with internal teeth 2 engaging similar teeth on the spindle *t* to rotate it, the nuts 3 to hold the levers *s* in position, the connecting-rods *r* and sliding sleeve *l* to actuate the levers *s* substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES HALL.

Witnesses:
J. OWDEN O'BRIEN,
B. TATHAM WOODHEAD.