No. 885,684. PATENTED APR. 21, 1908.

D. McD. BROUGHTON.

FRICTIONAL DRIVING GEAR.

APPLICATION FILED SEPT. 14, 1907.

4 SHEETS—SHEET 1.

Fig. 1

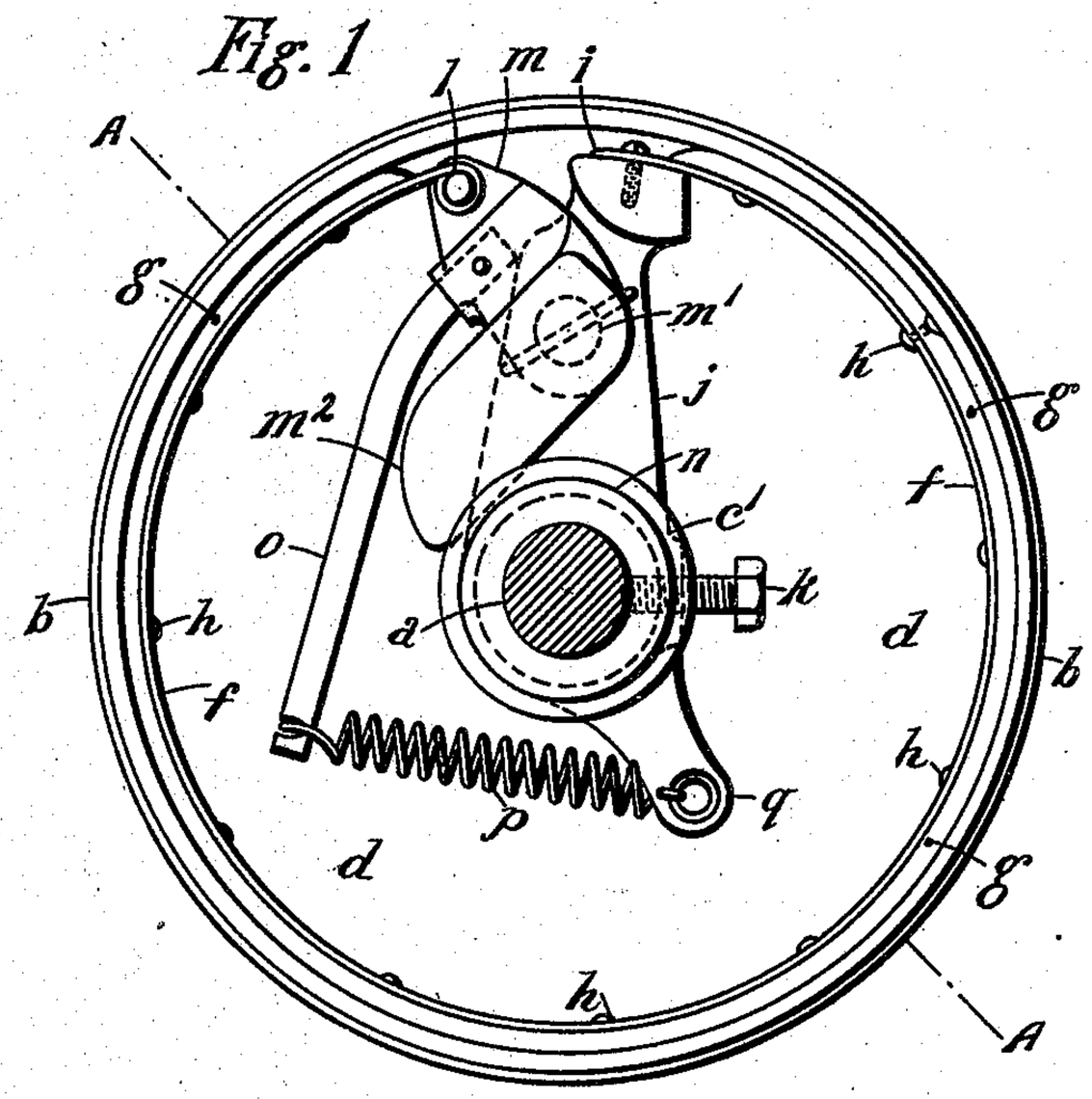
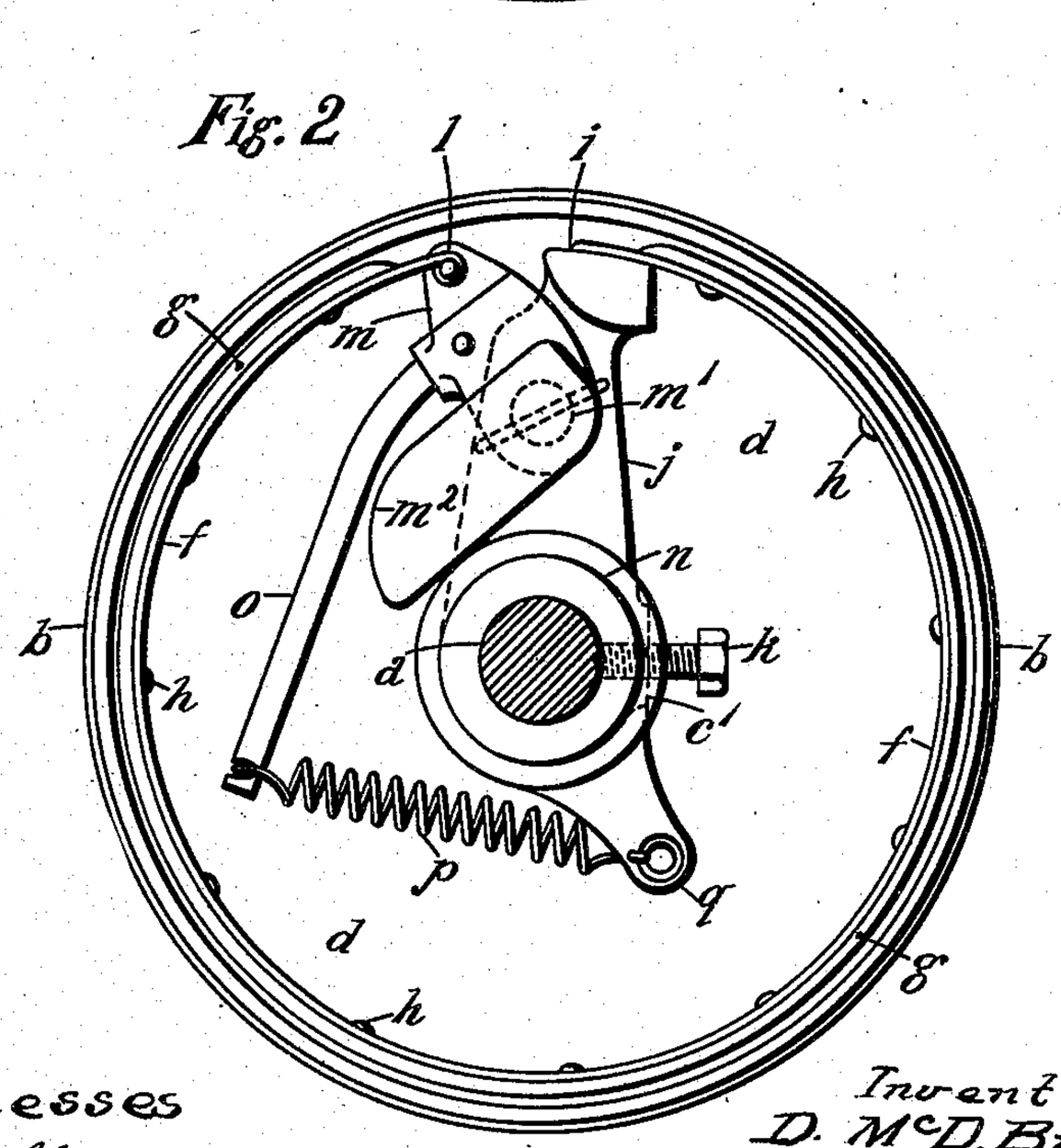


Fig. 2



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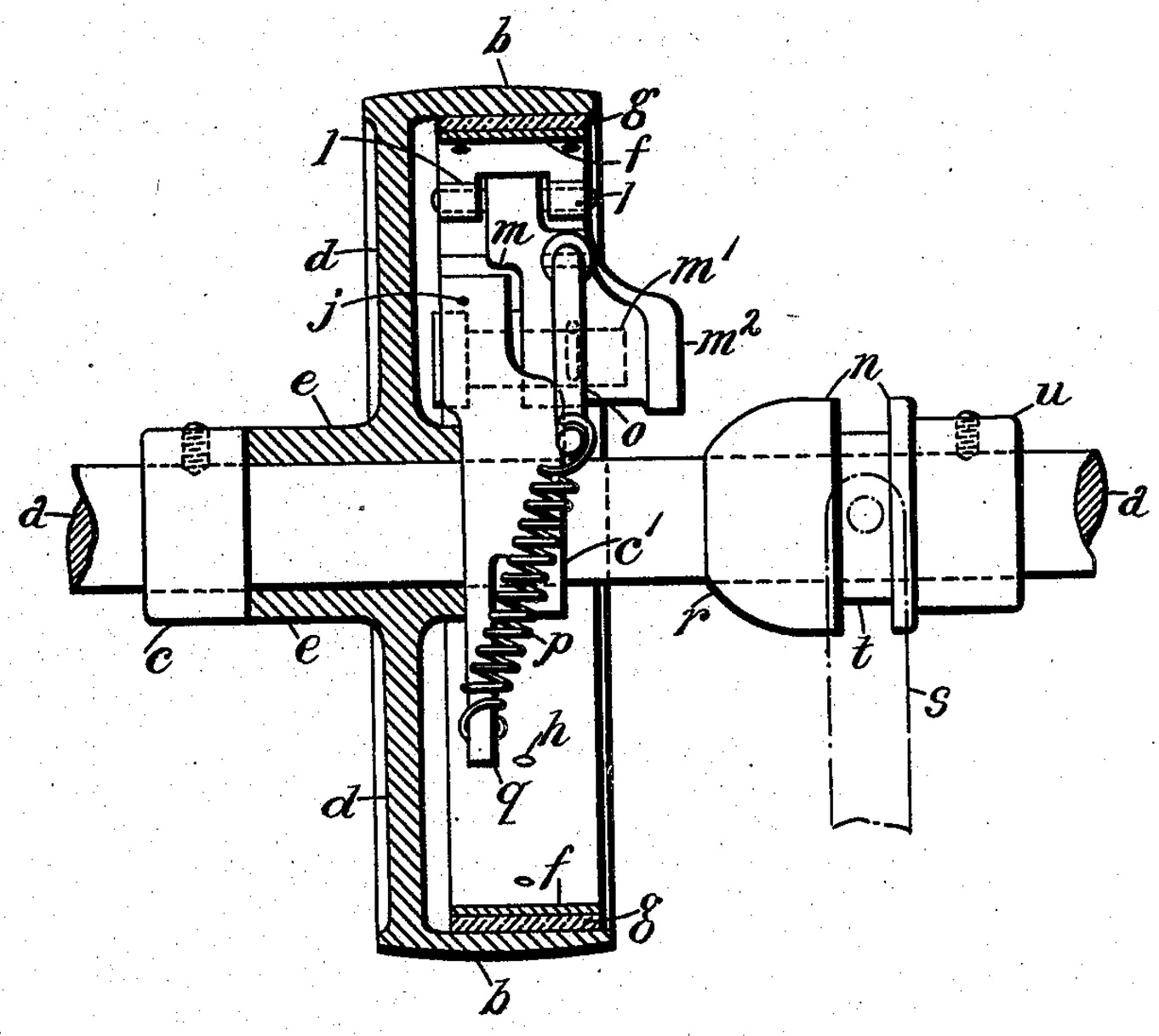
4 SHEETS—SHEET 2.

Fig. 3



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4 SHEETS—SHEET 3.

Fig. 4

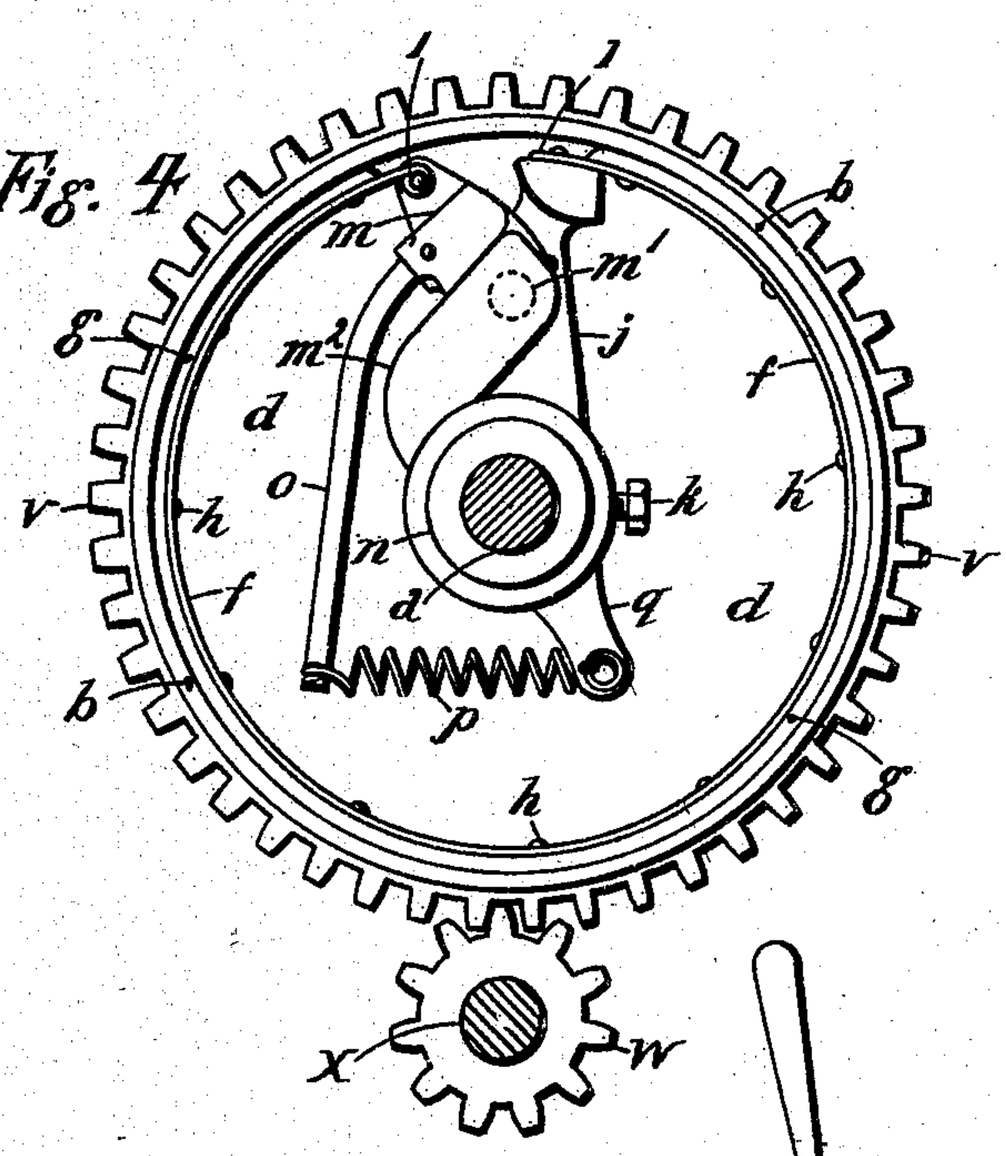
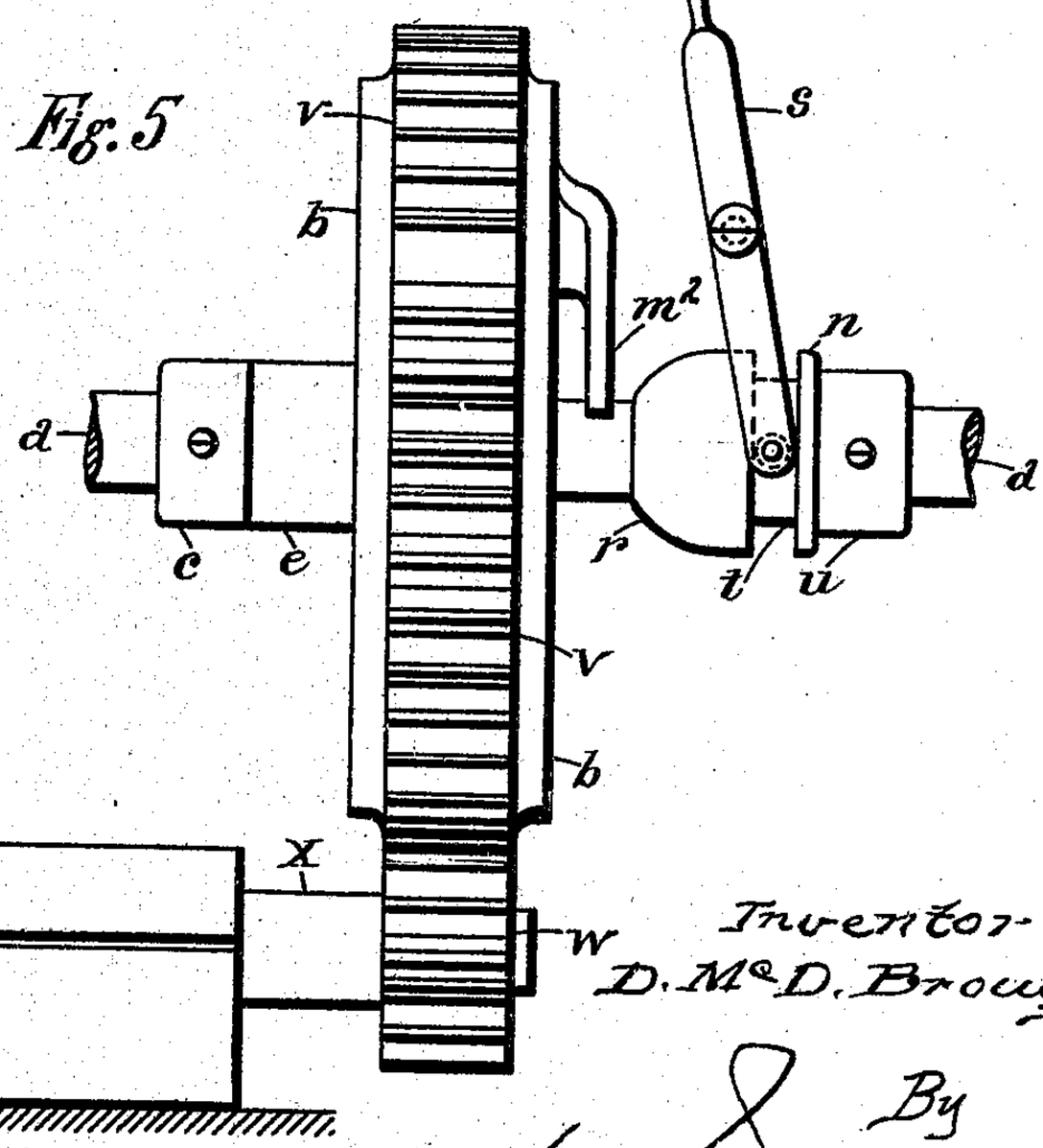


Fig. 5



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4 SHEETS—SHEET 4.

Fig. 6

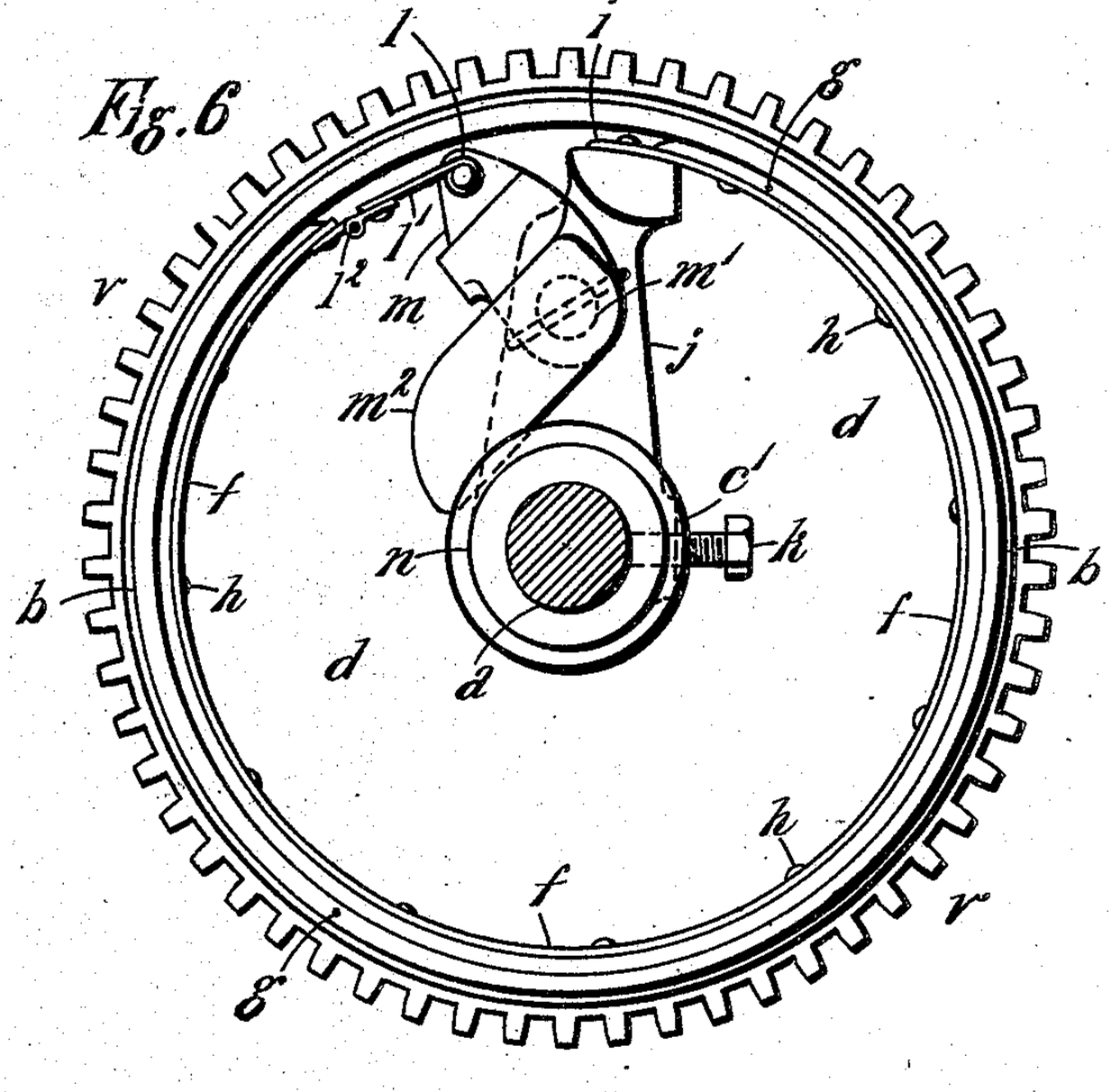
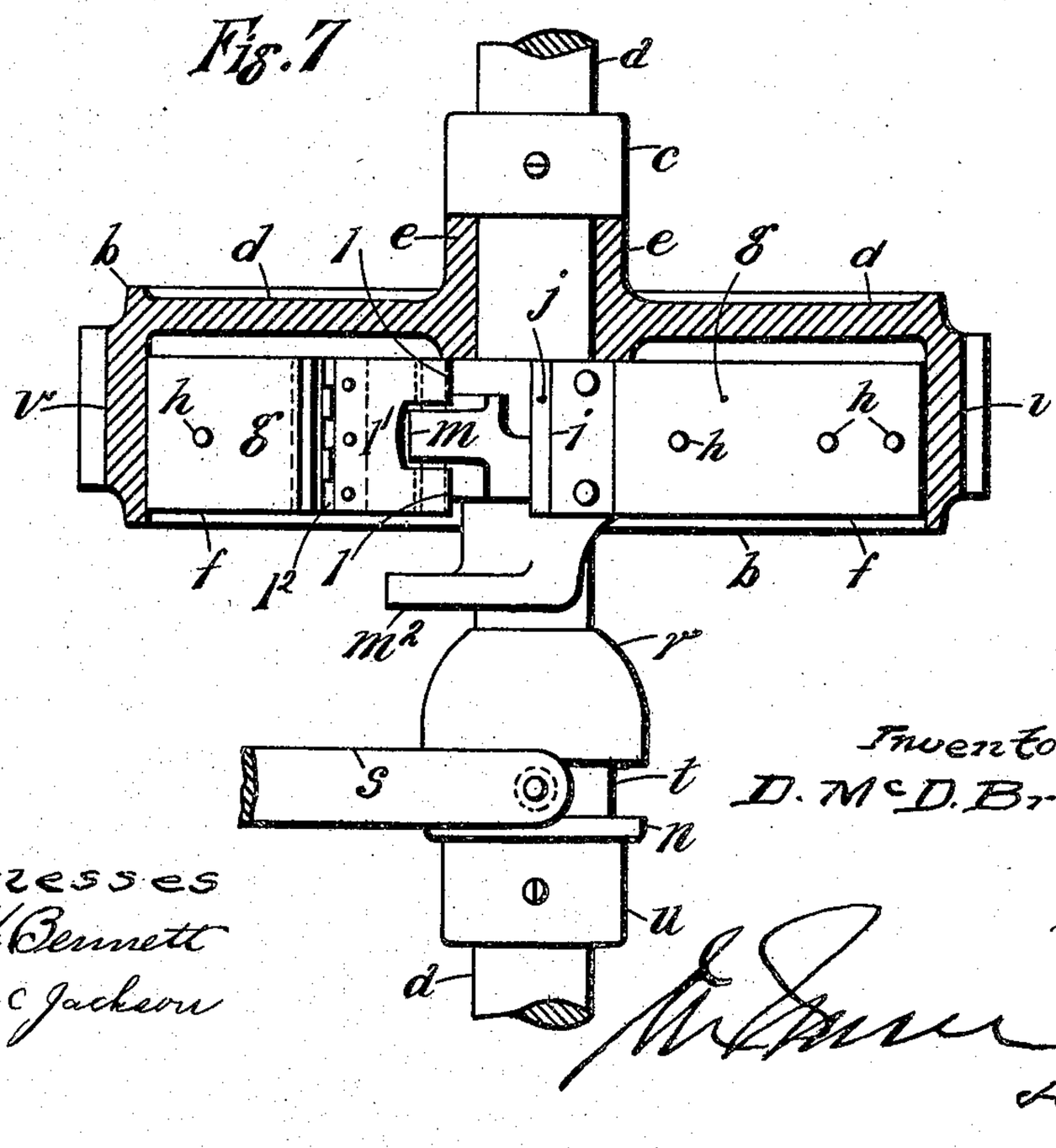


Fig. 7



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UNITED STATES PATENT OFFICE.

DENIS McDONNELL BROUGHTON, OF WOODFORD GREEN, ENGLAND, ASSIGNOR OF ONE-HALF TO THE BRITISH SIGARERA LIMITED, OF LONDON, ENGLAND.

FRICTIONAL DRIVING-GEAR.

No. 885,684. Specification of Letters Patent. Patented April 21, 1908.

Application filed September 14, 1907. Serial No. 392,830.

To all whom it may concern:

Be it known that I, DENIS MCDONNELL BROUGHTON, a subject of the King of Great Britain, of 3 Florence Villas, Woodford Green, in the county of Essex, England, Engineer, have invented a new and useful Improvement in Frictional Driving-Gear, of which the following is a specification.

This invention has more particular reference to that class of frictional driving gear in which a single pulley or wheel loosely mounted upon the shaft to be driven is adapted for frictional connection thereto when it is desired to get the shaft in rotation.

Hitherto gearing of the kind above referred to has usually comprised a loose pulley mounted upon the shaft to be driven, in combination with an internally and concentrically arranged friction strap; said strap being normally held in the operative position—through suitable connections—by means of a loose tapered collar adapted to be moved along the shaft between limiting stops. A disadvantage consequent upon this arrangement of parts has been the liability of the friction strap to become worn, and owing to the fixed diameter of the tapered collar, it must have some means of adjustment to compensate for this wear.

The object of the present invention is to obviate the foregoing disadvantage in a simple and effective manner, to insure perfect reliability in action as well as to prevent any failure of action through any parts becoming loose or worn when in use.

The invention consists essentially in disposing the friction strap so that it normally tends to engage firmly with the inner periphery of the loose pulley or wheel, and in arranging the sliding collar so that it is only brought into operation for releasing the strap from frictional contact with said loose pulley, or wheel.

The accompanying drawings are in illustration of my invention.

Figure 1 is a side elevation of a belt driven frictional gear constructed in accordance with my improvements and showing the friction strap in its operative position; Fig. 2 is a similar view to Fig. 1 but showing the friction strap out of engagement with the driving pulley; Fig. 3 is a transverse sectional elevation on the line A—A in Fig. 1; Fig. 4 is a side elevation of a slightly modified form of my invention, and Fig. 5 is an elevation taken at right angles to Fig. 4; Figs. 6 and 7 are respectively a side view and sectional plan of a further slightly modified form of the present invention.

Like letters of reference designate the same or similar parts in the various figures.

According to the forms of my invention illustrated, I arrange upon the shaft *a* to be driven a loose pulley or wheel *b* of metal or other suitable material, said pulley or wheel *b* being adated for free revolution between the collars *c*, *c'* formed upon or fixed to, as shown, the shaft *a*. The pulley or wheel *b* is preferably made with its periphery or rim more or less to one side of a supporting disk *d* or spokes at right angles to the hub *e*, so that a short cylinder or casing is constituted, one end being closed in by the said disk *d*. Inside the casing so constituted I arrange a concentric strap *f*, preferably a steel spring, the two ends of which are secured, as hereinafter more fully described, so that the normal tendency of the strap is to expand as much as may be required to bring itself into frictional engagement with the inner periphery of the loose pulley, or wheel, *b*, irrespective of wear on any part.

A strip of leather *g* or the like is secured to the outer surface of the strap *f* to insure increased friction and to prevent wear of the metallic surfaces, and it is conveniently fixed to the said strap *f* by riveting as shown at *h*, *h*, in Figs. 1 and 2, or it may be otherwise attached. One end *i* of the strap *f* is firmly connected to the end of an arm *j* extending radially outward from the boss or collar *c'*, securely held in position by means of a set screw *k* upon the shaft *a* to be set into rotation, to within a short distance of the inner periphery of the loose pulley or wheel *b*. The free end *l* of the strap *f* is hinged to the outer end of the short arm *m* of a bell-crank lever pivotally mounted at *m'* near the outer extremity of the aforesaid arm *j*; the other, or longer, arm m^2 of the bell-crank lever extending inwardly, and somewhat tangentially towards the shaft *a*, but does not come into actual contact therewith, as will be clearly understood from Figs. 1, 2 and 4, of the accompanying drawings.

To insure more perfect expansion of the

steel strap *f* when the sliding collar *n* is clear of the bell-crank lever and consequently more perfect engagement all over the surface of the strap *f* with the inner rim of the loose pulley or wheel *b*, I attach to the shorter arm *m'* of the bell-crank lever above described a strong metal rod *o*, as will be best seen on reference to Figs. 1, 2 and 4. To the free end of this rod *o* is attached one end of a tension spring *p*, the other end of which is secured to a short projecting arm *q* formed upon the boss *c'* carrying the radial arm *j* above described. Or, to further assist the expansive tendency of the strap *f* to evenly engage all round the inner periphery of the loose pulley or wheel *b*, I may provide the free end *l* of said strap with a hinged tongue-piece or link flap *l'* (Figs. 6 and 7), which is hinged at l^2 to the strap end and at its free end to the short arm *m* of the bell-crank lever above described. In this case and when applied to light speed gears I may dispense with the tension spring *x* and its connections, as shown in Fig. 6.

To disengage the strap *f* from contact with the rim of the loose pulley or wheel, I arrange upon the shaft *a* and adapted to be moved towards and away from the collar *c'* carrying the radial arm *j*, a freely fitting collar or sleeve *n* one end of which *r* (Figs. 3 and 5), that next the pulley, is somewhat tapered down or truncated. When the sliding collar *n* is moved towards the pulley, in any convenient manner, for example, by means of a pivoted lever *s*, shown in dot and dash lines in Fig. 3 and in full lines in Fig. 5, furnished with a forked end engaging in a groove *t* in said collar *n*, the truncated end *r* is forced between the longer arm m^2 of the bell-crank lever and the shaft *a* itself. This operation turns the bell-crank arm upon its pivot *m'* for a short distance and draws the friction strap *f* away from the pulley or wheel *b*. To return the parts, the sliding collar *n* is moved in the opposite direction, a stop *u* (Figs. 3 and 5) being provided to limit its movement away from the gearing.

In Figs. 1 to 3 I have shown a frictional driving gear adapted for operation by belt driven power, while Figs. 4 and 5 illustrate a clutch actuated by toothed gearing from any convenient source of energy, for example, an electric motor—not shown. *v* (Figs. 4 and 5) is a toothed rim formed upon and integral with the pulley or wheel *b* meshing with a small pinion *w* fixed upon the motor shaft *x*.

From the foregoing it will be seen that by my improvements a simple self-adjusting and very efficient frictional driving gear is provided.

The details of construction may be varied as may be found desirable to adapt my improvements to different working conditions, for example, I may dispense with the tension spring *p* and its connections in cases where the driving gear is not subjected to great working variations. Further, two, three or more gears constructed as described but of different speeds may be arranged side by side upon the shaft to be driven.

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

1. In a clutch, the combination of a shaft, a pulley mounted on said shaft and provided with a rim, a resilient strap, the tension of which is normally outward to impinge the inner surface of the rim, an arm fixed to the shaft and connected to the strap, a pivotally mounted lever pivotally connected to the opposite end of the strap, a slidable beveled member operable in the path of movement of the pivotally mounted arm to withdraw the strap out of contact with the rim.

2. In a clutch, the combination of a shaft, a pulley loosely mounted on said shaft and provided with a rim, a resilient strap, the tension of which is normally outward to impinge the inner surface of the rim, an arm fixed to the shaft, and connected to the end of the strap, a bell crank lever pivoted to the arm and pivotally connected to the opposite end of the strap, a spring normally pulling one arm of the bell crank lever toward the shaft to increase the friction between the strap and rim, and a slidable element operable in the path of movement of the bell crank lever to rock the same to disengage the strap from the inner surface of the rim.

3. In a clutch, the combination of a shaft, a pulley mounted thereon, a resilient strap normally in frictional contact with the pulley, means connecting one end of the strap to the shaft, a pivoted lever connected to said latter means and the opposite end of the strap, and a sliding beveled collar operable in the path of movement of the pivoted lever to disengage the strap from the pulley and thereby free the said pulley on the shaft.

4. In a clutch, the combination of a shaft, a pulley mounted thereon and having an outwardly extending rim, an arm fixed to the shaft and connected at its outer end to the strap, a bell crank lever pivotally mounted on the arm, one member being pivoted to the strap and the other member of said bell crank lever being located in the path of movement of a releasing element, and a sliding releasing element for operating the bell crank lever to release the strap from contact with the inner surface of the outwardly extending rim.

5. In a clutch, the combination with a shaft, a pulley loosely mounted on said shaft and having a rim, a resilient strap normally engaging the inner surface of the rim, an arm fixed to the shaft and connected at its outer end to one end of the strap, a bell crank lever pivoted to the arm, one member of the bell

crank lever being pivoted to the opposite end of the strap, the other member of the bell crank lever being in the path of movement of a releasing element, an arm extending from the bell crank lever, a spring connected to the latter arm and a projection fixed to the shaft, and a slidable element engaging one arm of the bell crank lever to release the strap from frictional engagement with the rim to free the pulley on the shaft.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

DENIS McDONNELL BROUGHTON.

Witnesses:

ALFRED G. BRATTON,

RICHARD GOERKE.