

B. T. L. THOMSON.
HYDRAULIC CLUTCH.

APPLICATION FILED JAN. 29, 1906.

2 SHEETS—SHEET 1.

Fig. 2

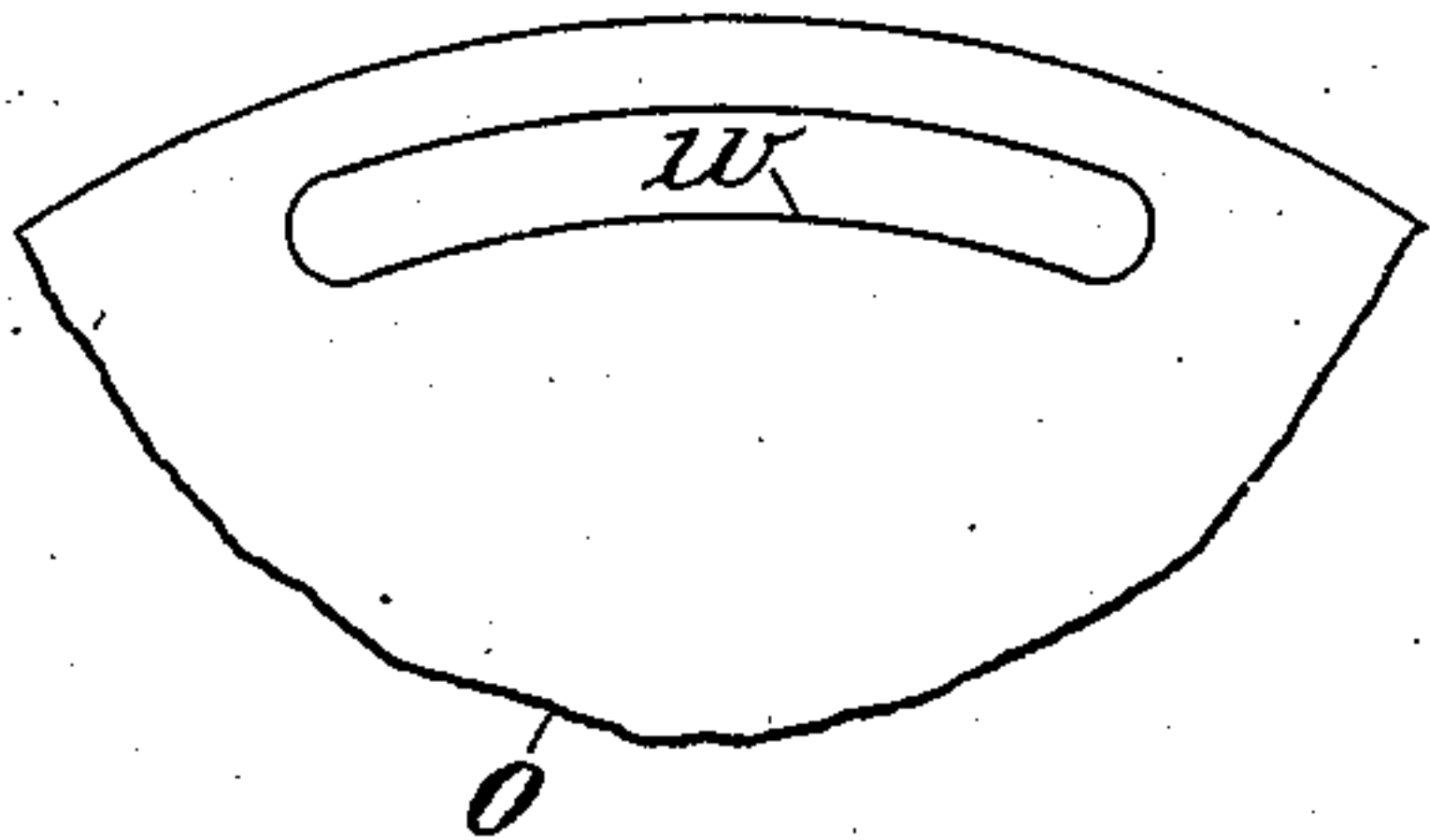


Fig. 1

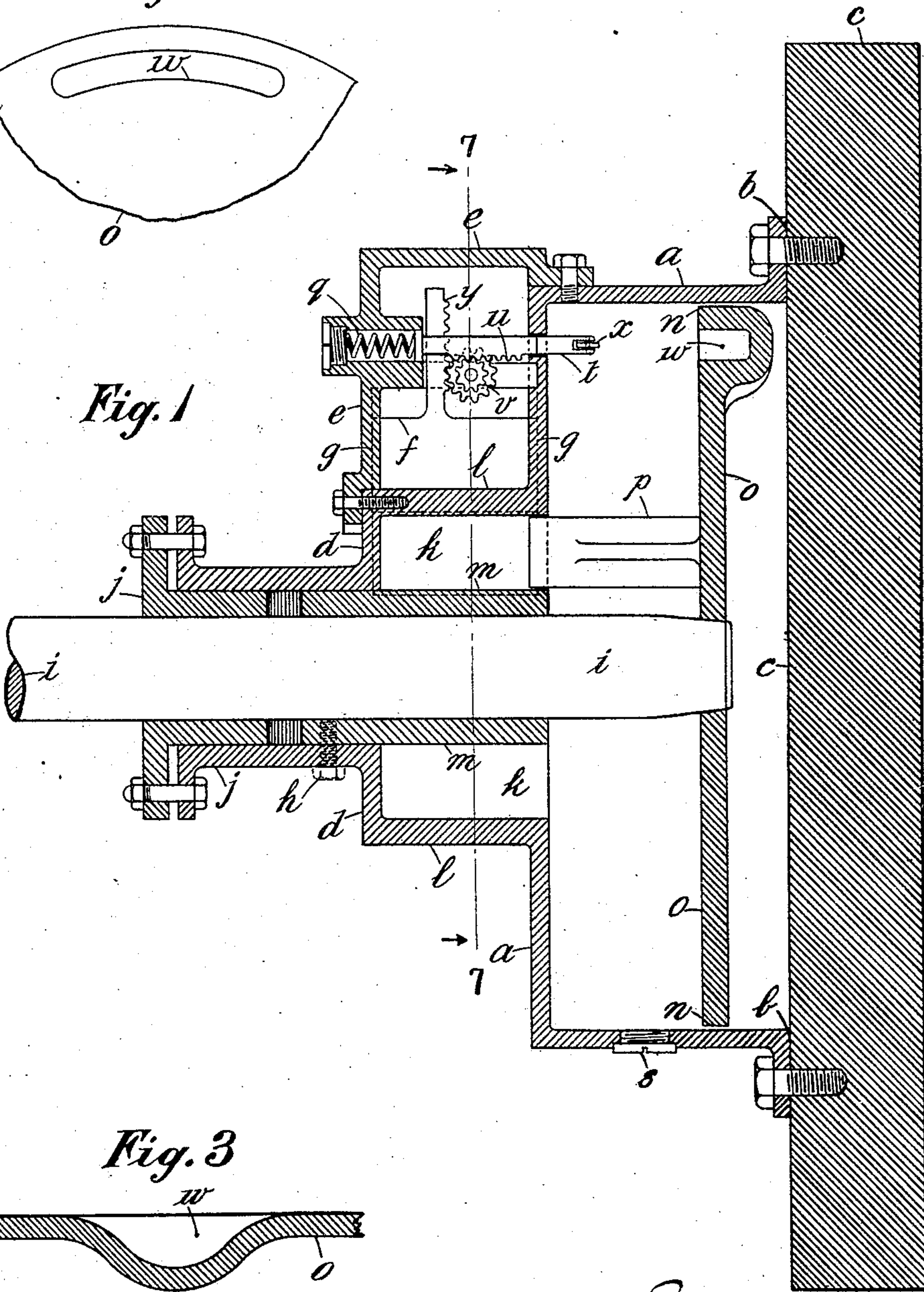
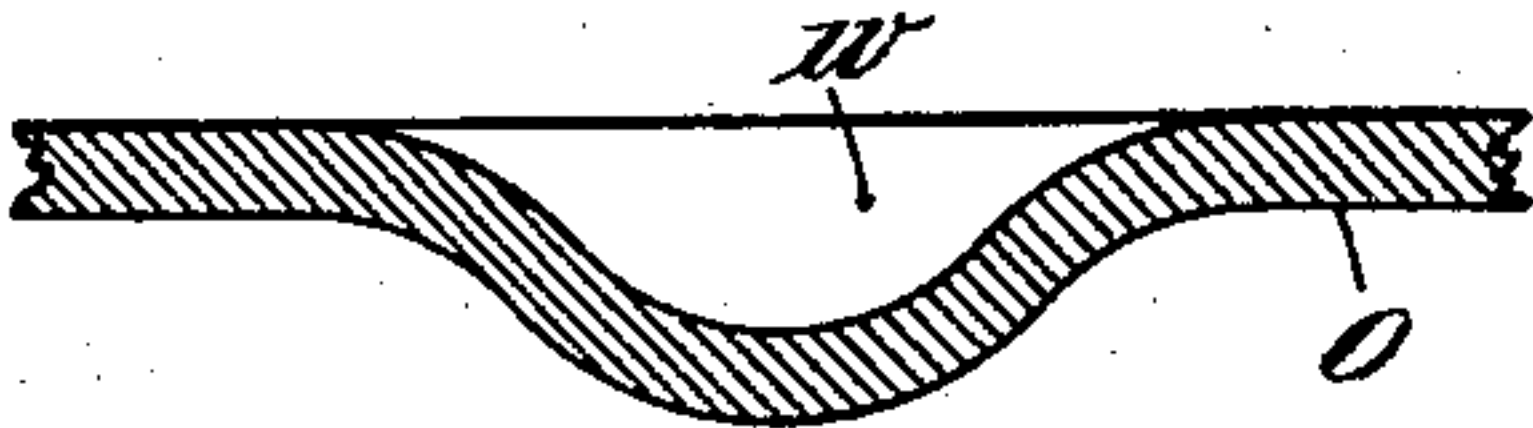


Fig. 3



Witnesses:
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Samuel Birley.

Inventor: B. T. L. Thomson
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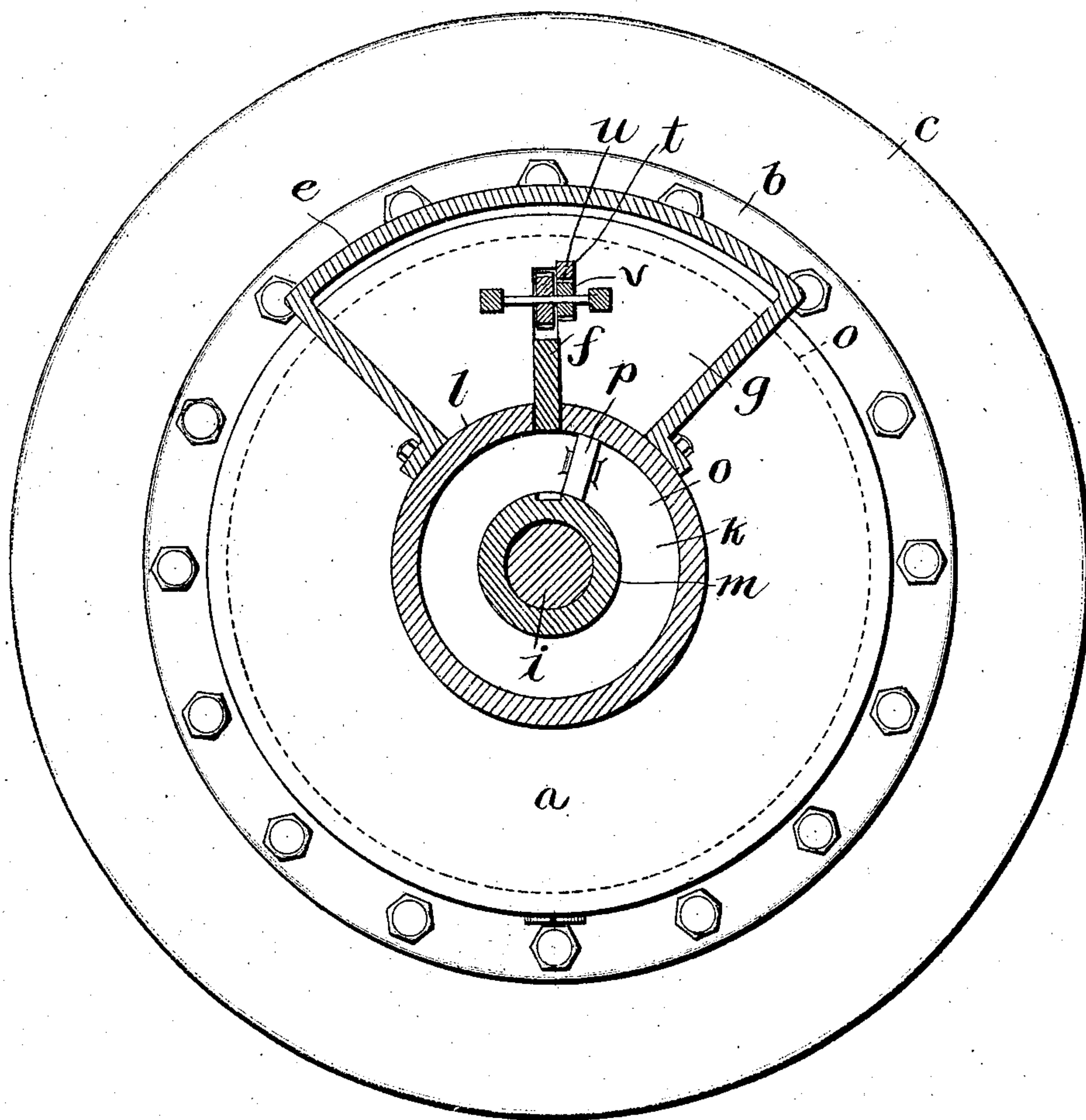
No. 848,510.

PATENTED MAR. 26, 1907.

B. T. L. THOMSON.
HYDRAULIC CLUTCH.
APPLICATION FILED JAN. 29, 1906.

2 SHEETS—SHEET 2.

Fig. 4.



Witnesses
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Inventor
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UNITED STATES PATENT OFFICE.

BENJAMIN T. L. THOMSON, OF CLAPHAM COMMON, ENGLAND.

HYDRAULIC CLUTCH.

No. 848,510.

Specification of Letters Patent.

Patented March 26, 1907.

Application filed January 29, 1906. Serial No. 298,563.

To all whom it may concern:

Be it known that I, BENJAMIN THOMAS LINDSAY THOMSON, a subject of the King of Great Britain, of 117 North Side, Clapham Common, in the county of Surrey, England, have invented a new and useful Improvement in Hydraulic Clutches, of which the following is a specification.

My invention relates to hydraulic clutches used for bringing machinery into motion gradually and without shock, and also for altering at will the speed of machinery so driven, and especially suitable to act as a clutch upon a motor-car.

It has reference more especially to improvements upon the hydraulic clutch for which a patent was granted to G. Sparks, dated September 12, A. D. 1905, and numbered 799,102.

The objects of my improvement are, first, to make the clutch very simple and effective, and, second, to reduce its liability to get out of order. I attain these objects by the mechanism illustrated in the accompanying drawings, showing the hydraulic clutch applied to a motor-car, in which—

Figure 1 is a longitudinal section of the entire hydraulic clutch. Fig. 2 is a front view; Fig. 3, a transverse section of the recess in the disk by which the clutch is operated, and Fig. 4 is a section on line 7 7 of Fig. 1.

Similar letters refer to similar parts throughout the several views.

a is an outer cylindrical case, of metal, one end of which, *b*, is open and is firmly bolted or attached to the side of the fly-wheel *c* of the motor, a tight joint being made between them. Near the other or outer closed end *d* of the case *a* (which end is of smaller diameter than the other end) I bolt upon its outer circumference a chamber or pocket *e*, and into this chamber *e* a metal abutment block or diaphragm *f*, moving radially in or out in guides *g*, can be forced in or drawn out, as desired. A central metal sleeve *m* is attached to the center of the outer or closed end of the cylinder *a*, and through it passes centrally the shaft *i*, connected with the gear which is to be driven by the fly-wheel *c* when the clutch is in operation, a stuffing-box *j* being provided upon the end of the cylinder at *d*, through which the shaft *i* passes. On the inside of the outer end *d* of the chamber is formed an annular chamber *k*, the two concentric cylinders *l* and *m*, formed upon or fixed to the cylinder, being open at their inner end

and forming between them a chamber *k*, having its inner end open into the cylinder *a*. *h* is a screw by which the sleeve *m* is held in position.

The central shaft *i*, which passes through the sleeve or inner cylinder *m*, is stationary when the clutch is out of operation, although the fly-wheel *c* and outer cylindrical case *a* are revolving when the motor is working. In order to couple or clutch the shaft *i* and the fly-wheel *c* together when required, I fix firmly upon the inner end of the shaft *i* a metal disk *o*, the edge of which *n* can revolve freely inside the cylinder *a*, and this disk, together with the shaft *i*, can be drawn toward or removed from the open end of the annular chamber *k*, formed by the concentric cylinders *l* and *m*, as above described, by means of a foot-lever operated by the driver of the motor-car in the usual way, (the details not being shown in the drawings, as they form no part of the present invention,) and upon the face of the disk *o* is fixed or formed a strong projecting arm or piston *p*, parallel with the central shaft *i* and of such shape that when the disk *o* is moved toward the open end of the annular chamber *k* by the driver of the car the projecting arm *p* enters into the annular chamber, in which it fits freely, so that when the shaft *i* is stationary the annular chamber *k*, together with the outer cylinder *a* and the fly-wheel *c*, to which the latter is attached, revolve round it. The object of the clutch is therefore to connect the annular chamber *k* and the arm or piston *p*, which projects into it, more or less immovably together, so that the central shaft *i* may be carried round with the engine fly-wheel *c* and drive the gear in the usual way. For this purpose I fit into the projecting chamber *e*, outside the cylinder, a radial metal plate or block *f*, (which may be called a "driving-block,") the inner end of which passes freely through a slot in the outer one, *l*, of the cylinders (*l* and *m*) which form the annular chamber *k*, so that it forms a diaphragm or stop across the latter, which may be made to fill entirely or partly, as may be required, the annular chamber *k*, (in cross-section.)

The entire apparatus is filled with oil or other suitable liquid through a valve or opening *s*, arranged in an accessible position in the outer cylinder *a* and which may also be made (if desired) to act as a relief-valve should unnecessary pressure of the oil from any cause arise.

In order to free the clutch, the foot-pedal must be depressed, by which the metal disk *o* upon the central shaft is brought back toward the fly-wheel *c* and at the same time the
 5 radially-sliding plate or driving-block *f* is automatically withdrawn outward (by the means hereinafter described) into the chamber *e* outside the outer cylinder *a*. When the foot is taken off the pedal, the metal disk
 10 *o* is brought against the inside of the outer case *a*, (or against a projecting rim inside the latter,) and at the same time the outer part of the face of the disk near its edge forces back a bar *t*, movable endwise, which is pro-
 15 jected by a strong spring *g* from the inner part of the supplementary chamber *e* into the cylinder *a*, and this projecting bar *t* at its other end is connected with a toothed bar or rack *u*, operating a wheel *v*, and a toothed
 20 rack *y* upon the outer edge of the driving-block *f*, which forces the driving block or plate *f* radially inward, so that it forms a diaphragm more or less filling the annular chan-
 25 nel *k*, the open end of which is at the same time closed by the disk *o*. In this position if the sliding block *f* and the piston or bar *p*, projecting from the disk *o*, fitted the annular
 30 channel *k* so closely that no liquid could pass the projecting bar or piston *p* could not pass independently along the annular channel *k* and would be carried round with the latter as if the whole constituted one solid mass, while by withdrawing the projecting bar *p*
 35 more or less from the annular chamber *k* the shaft *i* will be clutched to the outer cylinder *a* and fly-wheel *c* by means of the intervening fluid, more or less positively, according to the space opened by the withdrawal of the piston *p*.
 40 In order to prevent the possibility of the projecting fixed arm (or piston) *p* upon the metal disk *o* striking the sliding driving-block *f*, I groove out the rim of the disk at *w*, as shown separately in Fig. 2, which is a
 45 front view of part of the disk *o*, showing the recess or groove *w*, Fig. 3, being a longitudinal section through the recess. The ends of the recess *w* are inclined, so as to allow the end of the arm *t*, which is shown provided
 50 with a friction-roller *x*, to enter and leave the recess *w* gradually. The recess is directly radially outside the projecting arm *p*, so that the movable sliding bar *t* can be forced out-
 55 ward by the spring *u* to draw out the sliding driving-block *f*, (exactly at the right time,) and thus allows the piston-bar *p* upon the disk to clear it as it passes round the annular chamber *k*.

The details of construction may be varied
 60 more or less, as may be found advisable. For instance, two similar chambers *e*, diametrically opposite to each other, may be used, with driving-blocks *f*, toothed bar *y*, toothed bars *u*, and gear *v* on the disk *o*.

65 Instead of being fixed upon the shaft *i* the

disk *o* may be fixed upon the end of a sleeve fitting on the shaft *i*, so that it can move end-
 wise, but cannot revolve upon the latter. This sleeve passes through the stuffing-box *j*
 upon the end of the cylinder at *d* and is pro- 70
 vided upon its outer end with a clutch connected to the pedal, so that the sleeve and the disk *o*, carried by it, can be pressed forward when desired in the manner already de-
 75 scribed, a helical spring surrounding the sleeve being interposed between the clutch and the stuffing-box. The shaft *i* does not move endwise.

The projecting arm or piston *p* need not be
 80 entirely withdrawn from the annular chamber *k*, and to render its revolving movement with the disk *o* more easy a passage may be made between the annular space *k* and the interior of the case *a*, the passage being closed
 85 by a valve closed by a strong spring and withdrawn by means of a lever and rod acted upon by a flange upon the face of the clutch
 upon the stuffing-box, so that when the latter is pushed in by the pedal the valve is at
 90 the same time opened and an additional passage opened for the free passage of the oil or other liquid as the piston *p* revolves.

The hydraulic clutch described is very
 simple and effective and not liable to get out
 95 of order.

Having fully described my invention, what
 I desire to claim and secure by Letters Pat-
 ent is—

1. In a hydraulic clutch of the character
 described, the combination with the driving 100
 member, of a hollow casing connected thereto, a driven member projecting into said casing, an annular chamber formed within said casing, a fluid therein, a member carried by
 said driven member and adapted to be pro- 105
 jected into said annular chamber, a sliding member, and means for automatically projecting said sliding member into said annular chamber, substantially as described.

2. In a hydraulic clutch of the character 110
 described, the combination with the driving member, of a hollow casing connected thereto, a driven member projecting into said casing, an annular chamber formed within said casing, a fluid therein, a member carried by
 said driven member and adapted to be pro- 115
 jected into said annular chamber, a sliding member, and means for automatically projecting and withdrawing said sliding member into and from said annular chamber, substan- 120
 tially as described.

3. In a hydraulic clutch of the character
 described, the combination with the driving
 member, of a hollow casing connected thereto, a driven member projecting into said cas- 125
 ing, an annular chamber formed within said casing, a fluid therein, a piston carried by
 said driven member and adapted to be pro-
 jected into said annular chamber, a sliding
 member, means for projecting said sliding 130

member within said annular chamber, and means for momentarily and automatically withdrawing said sliding member to clear said piston, substantially as described.

4. In a hydraulic clutch of the character described, the combination with the driving member, of a main casing connected thereto, a driven member projecting into said casing, an annular chamber formed within said main casing, a fluid therein, a member carried by said driven member and adapted to be projected into said annular chamber, a supplemental casing, a sliding member arranged therein and adapted to be projected into said annular chamber, and means for automatically withdrawing said sliding member from said annular chamber, substantially as described.

5. In a hydraulic clutch of the character described, the combination with the driving member, of a main casing connected thereto, a driven member projecting into said casing, a disk mounted on the inner end of said driven member, an annular chamber formed within said main casing, a fluid therein, a piston carried by said disk and adapted to be projected into said annular chamber, a supplemental casing, a sliding member arranged therein, mechanism actuated by said disk to project said sliding member into said annular chamber when said piston is within said chamber, and means for automatically withdrawing said sliding member upon the withdrawal of said piston, substantially as described.

6. In a hydraulic clutch of the character described, the combination with the driving member, of a main casing connected thereto, a driven member projecting into said casing, a circular disk mounted on the inner end of said driven member, an annular chamber formed within said main casing, a fluid therein, a piston carried by said disk and adapted to be projected into said annular chamber, a supplemental casing, a sliding member arranged therein, a rack carried by said sliding member and engaging a toothed wheel, a rack-bar arranged at right angles to said first-mentioned rack and engaging a toothed wheel mounted on a shaft with said first-mentioned wheel, the inner end of said last-named rack-bar being adapted to normally project within the main casing, whereby when the said driven member is moved to project the said piston within the said annular chamber, the said disk will actuate said rack-bar to project said sliding member within said chamber, and means for automatically withdrawing said sliding member, substantially as described.

7. In a hydraulic clutch of the character

described, the combination with the driving member, of a main casing connected thereto, a driven member projecting into said casing, a circular disk mounted on the inner end of said driven member, an annular chamber formed within said main casing, a fluid therein, a piston carried by said disk and adapted to be projected into said annular chamber, a supplemental casing, a sliding member arranged therein, a rack carried by said sliding member and engaging a toothed wheel, a rack-bar arranged at right angles to said first-mentioned rack and engaging a toothed wheel mounted on a shaft with said first-named wheel, the inner end of said last-named rack-bar being adapted to project within said main casing and to be actuated by said disk on said driven member to project said sliding member into said annular chamber, and a spring arranged on the other end of said rack-bar to withdraw said sliding member when said driven member is moved to unclutch, substantially as described.

8. In a hydraulic clutch of the character described, the combination with the driving member, of a main casing connected thereto, a driven member projecting into said casing, a circular disk mounted on the inner end of said driven member, an annular chamber formed within said main casing, a fluid therein, a piston carried by said disk and adapted to be projected into said annular chamber, a supplemental casing, a sliding member arranged therein, a rack carried by said sliding member and engaging a toothed wheel, a rack-bar arranged at right angles to said first-named rack and engaging a toothed wheel mounted on a shaft with said first-named wheel, the inner end of said last-named rack-bar being adapted to project within said main casing and to be actuated by said disk on said driven member to project said sliding member into said annular chamber, an antifriction-roller mounted in the projecting end of said rack-bar, a spring arranged at the other end of said rack-bar to withdraw said sliding member, said actuating-disk being provided with a recess above and extending a short distance on both sides of the said piston, whereby the said rack-bar will enter said recess as the main casing moves around and the sliding member will be momentarily withdrawn to clear the said piston and then again projected into the annular chamber, substantially as described.

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

B. T. L. THOMSON.

Witnesses:

ARTHUR E. EDWARDS,
DOROTHY K. BOYLE.