

No. 622,504.

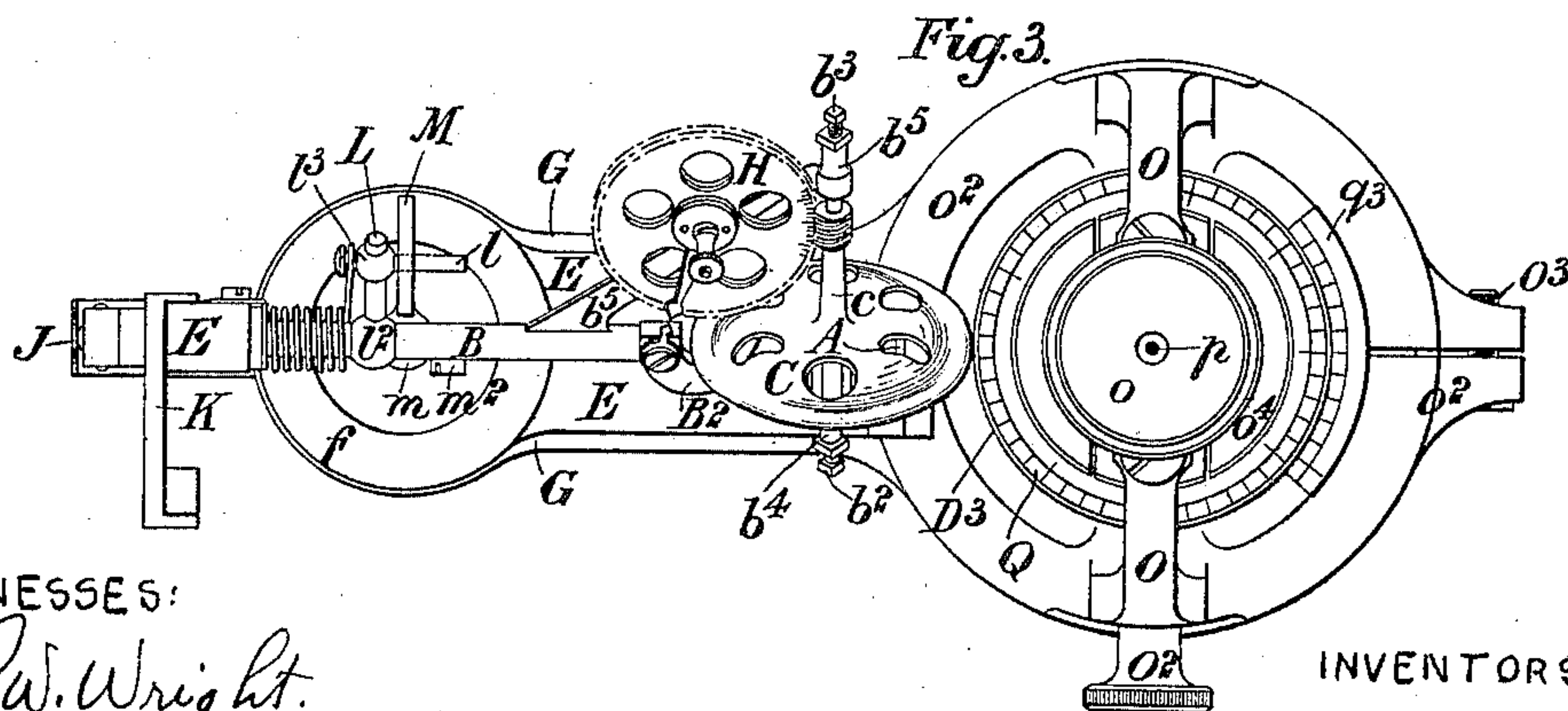
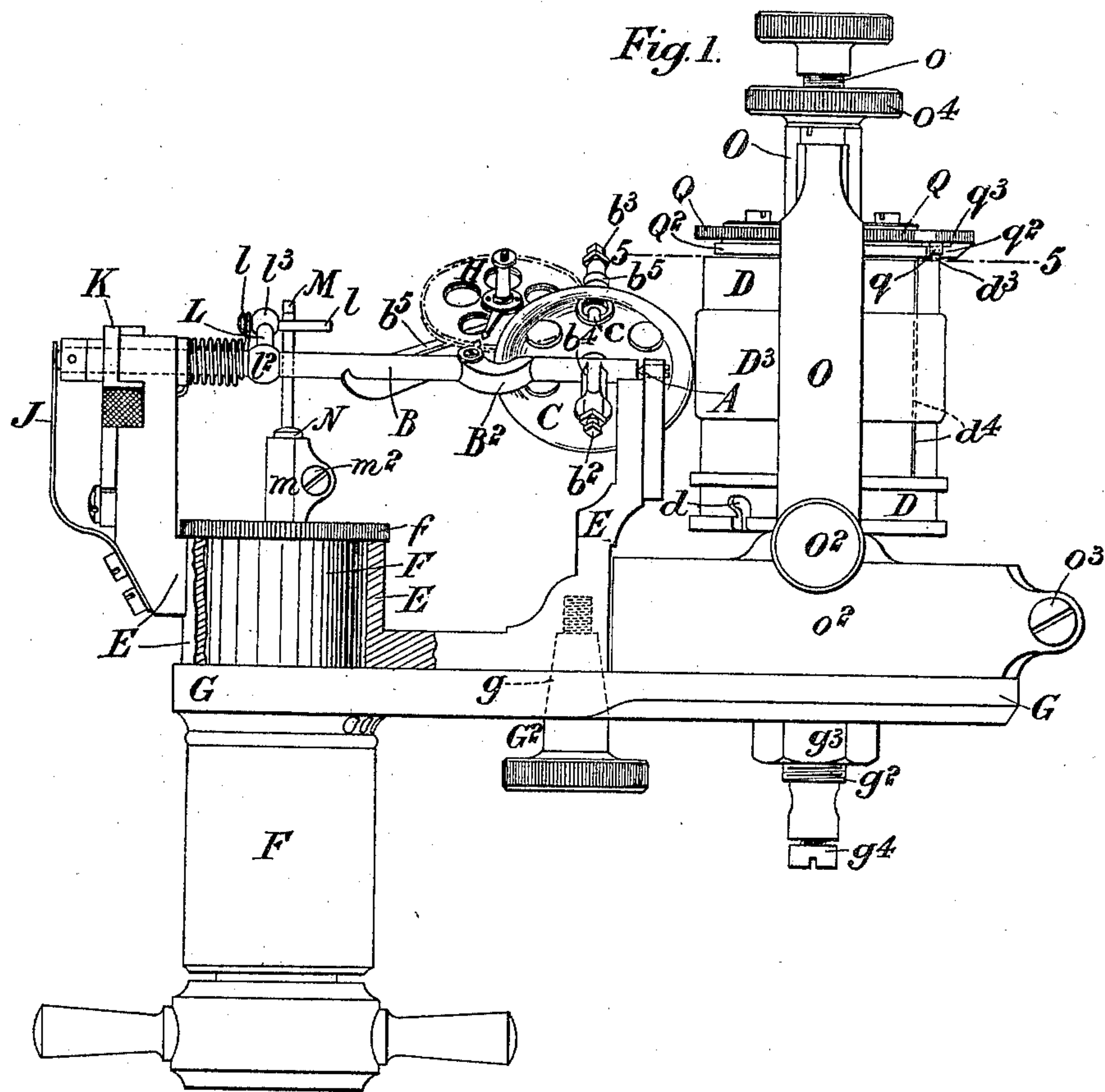
Patented Apr. 4, 1899.

W. G. & C. W. G. LITTLE.
STEAM ENGINE INDICATOR.

(Application filed July 6, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

P. W. Wright.
A. C. Connor

INVENTORS

WILLIAM GODSON LITTLE

CHARLES WILLIAM GODSON LITTLE

BY
Howson and Howson
THEIR ATTORNEYS.

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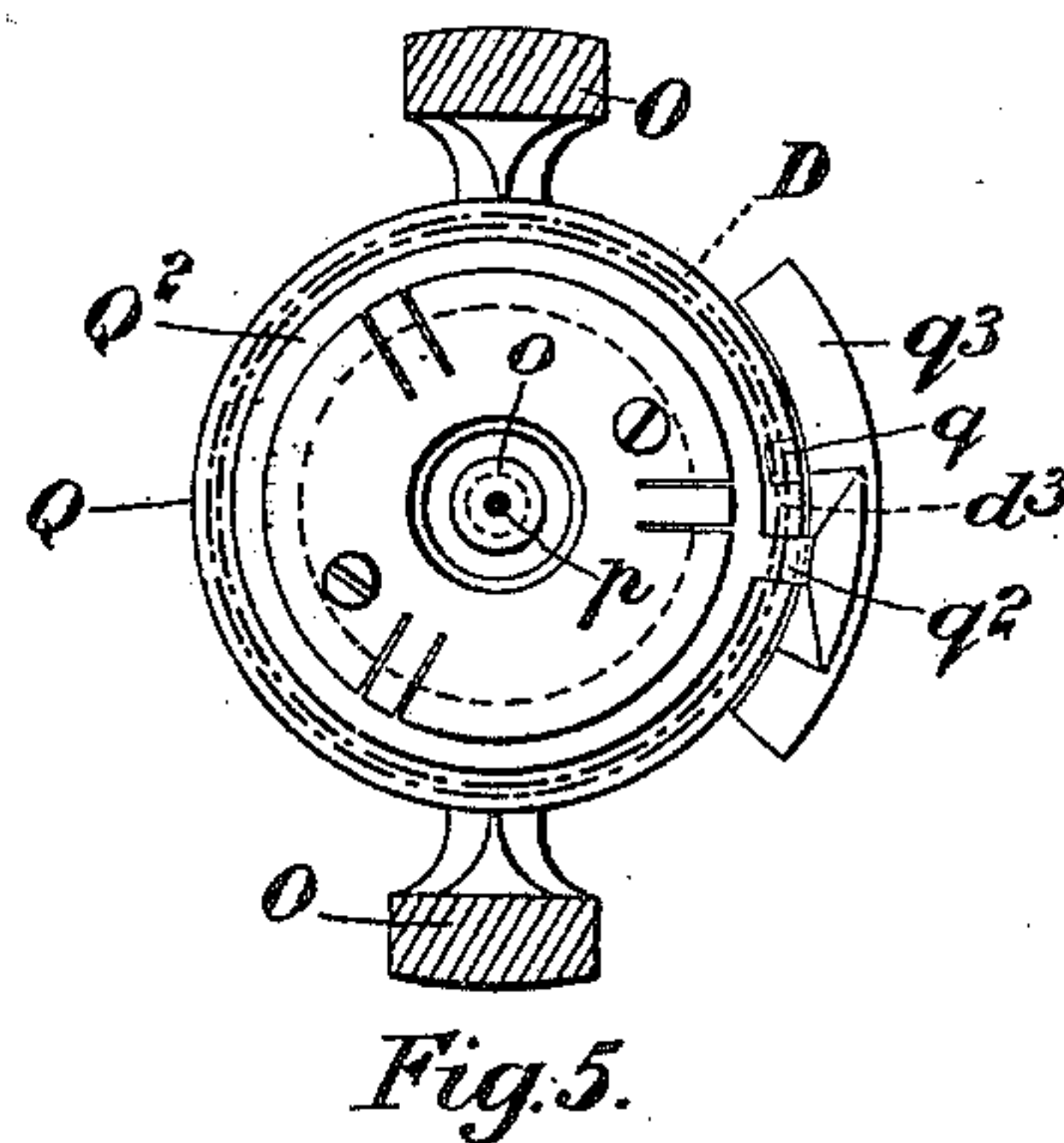
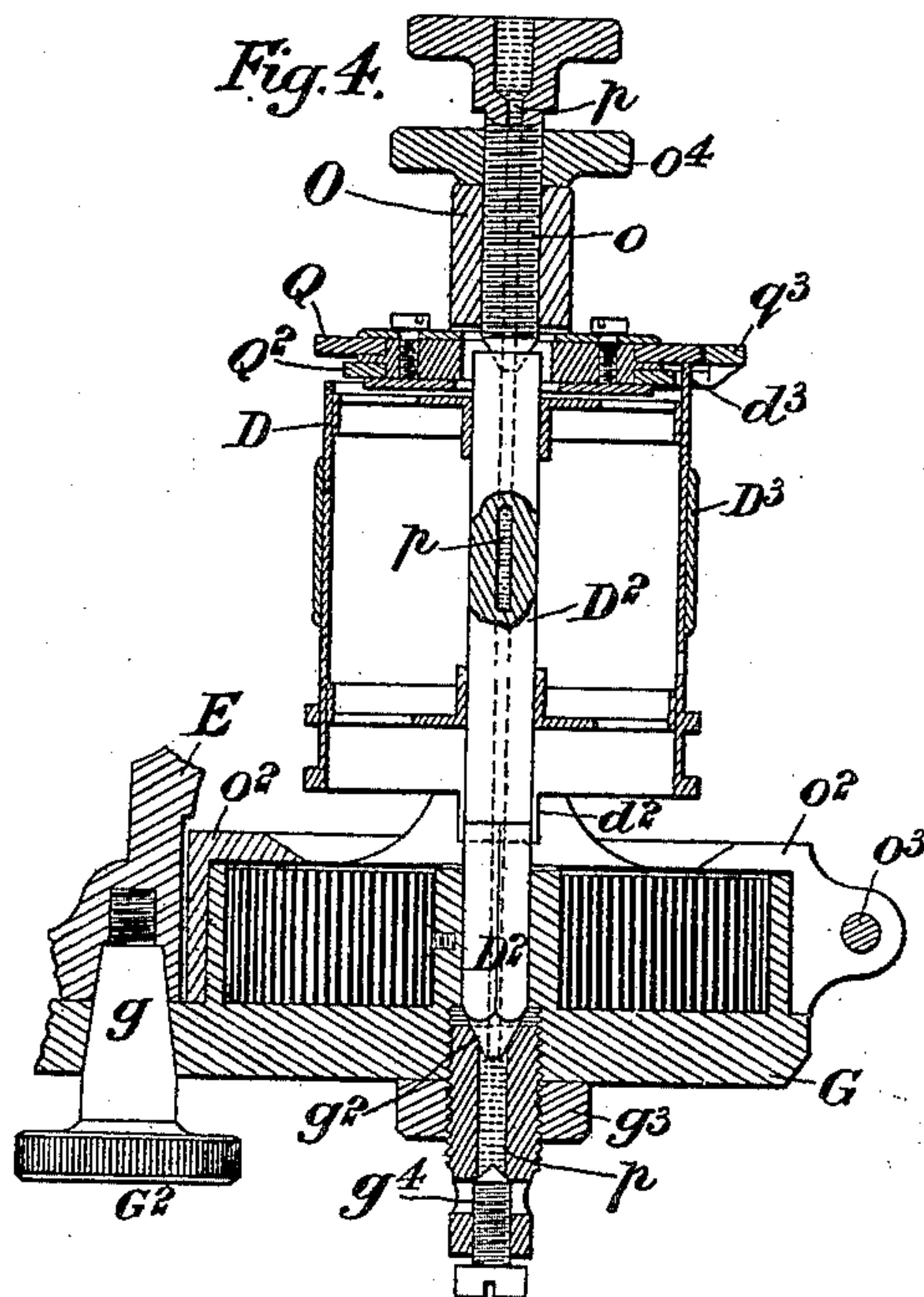
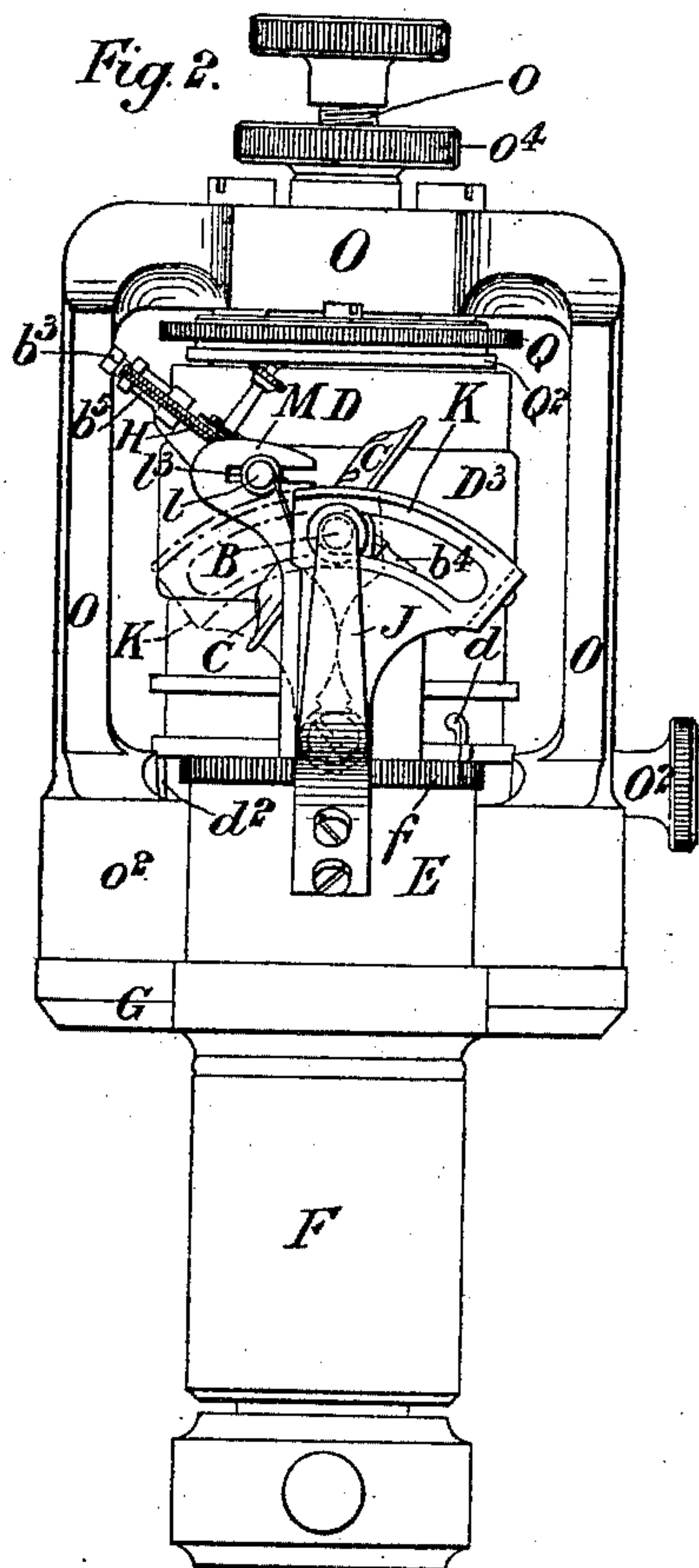
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UNITED STATES PATENT OFFICE.

WILLIAM G. LITTLE, OF BEXLEY, AND CHARLES W. G. LITTLE, OF HECKINGTON, ENGLAND.

STEAM-ENGINE INDICATOR.

SPECIFICATION forming part of Letters Patent No. 622,504, dated April 4, 1899.

Application filed July 6, 1898. Serial No. 685,270. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM GODSON LITTLE, engineer, a resident of Blendon Grove, Bexley, in the county of Kent, and CHARLES WILLIAM GODSON LITTLE, engineer, a resident of Heckington, in the county of Lincoln, England, subjects of the Queen of Great Britain and Ireland, have invented certain new and useful Improvements in Steam-Engine Indicators, (for which we have applied for a patent in Great Britain, No. 29,199, dated December 9, 1897,) of which the following is a specification.

This invention relates to apparatus forming the subject-matter of British Letters Patent No. 17,575, granted to us and dated September 15, 1894, and has for its object to improve the construction and operation of such apparatus.

We will describe the invention by reference to the accompanying drawings, in which—

Figure 1 is a side elevation, partly broken away, of one of our improved indicators. Figs. 2 and 3 are respectively an elevation of the left-hand end and a plan of Fig. 1. Fig. 4 is a longitudinal vertical section of a portion of the indicator, and Fig. 5 is an inverted horizontal section on the line 5 5 of Fig. 1.

Like letters of reference indicate like parts throughout the drawings.

According to this invention, as shown in Figs. 1 and 3, the forward bearing A of the oscillating shaft B (in which is mounted or to which is pivotally connected the frictionally-rotated integrating-wheel C) is situated as close to the drum D as possible, so as to reduce jarring or vibration to a minimum. This is effected by dishing the integrating-wheel C and providing the bearing A within the hollow therein, the shaft B having its axis of rotation within the plane of the rim of the wheel, but being bent or cranked at B² to clear the wheel.

The oscillating shaft B is mounted in a carriage E, fitting upon the upper end of the pressure-cylinder F, the cover *f* of which serves to retain the carriage on the said cylinder. The carriage is secured to the bracket G by a screw G², a tapered part *g* of which engages with the bracket, so as to insure that

the axis of the oscillating shaft B shall be at right angles to and in a line cutting the axis of the drum D. When the screw G² is removed, the carriage E, together with the integrating-wheel C and the counter H, carried thereby, may be turned on the pressure-cylinder F away from or out of line with the drum D.

The spindle *c* of the integrating-wheel C is supported between two adjustable centers *b*² *b*³, of which the center *b*² is mounted in an arm *b*⁴, projecting from the oscillating shaft B, and the center *b*³ is mounted in a V-shaped frame *b*⁵, secured to the said oscillating shaft, the arms of this frame being preferably of L or equivalent section, so as to combine lightness with rigidity. This frame serves also to support the counter H.

The rearward end of the oscillating shaft B is acted upon by a blade-spring J, which presses the integrating-wheel C toward the drum D, and the shaft may be moved back against the pressure of this spring by means of a pivoted cam or wedge shaped segment K.

The crank L and crank-pin *l*, by which motion is transmitted to the shaft B from the piston working within the cylinder F, may be so connected that the angle of the crank in relation to the axis of the integrating-wheel C and the position of the crank-pin *l* on the crank L can be adjusted to provide for any desired angular throw being imparted to the wheel for a given pressure. For this purpose the crank L is formed with a boss *l*², adjustable in a rotary direction on the shaft B, and the crank-pin *l* is formed with a boss *l*³, adjustable longitudinally on the crank, the several parts being soldered or otherwise secured together when their proper relative positions have been determined.

The slotted head M, which engages with the crank-pin *l*, is secured to the piston-rod N by a split sleeve *m* and screw *m*², so that by loosening the screw the said sleeve may be readily detached to enable the cylinder-cover *f* to be unscrewed and the piston, piston-rod, and spring removed from the cylinder F.

The shaft D² of the drum D, as shown in Fig. 4, is coned at its lower end to fit into a coned adjustable bearing *g*² in the bracket G,

and at its upper end it is provided with a cup for receiving a center bearing o , which is adjustable in a bridge O , which extends over the drum D and is clamped to the bracket G by a split sleeve o^2 and screw o^3 . The two drum-bearings g^2 and o are provided with lock-nuts g^3 and o^4 , respectively, for securing them in position, and they and the drum-shaft D^2 are axially perforated, as at p , so as to constitute a common chamber containing a supply of lubricant for lubricating the bearings during the working of the apparatus. The bearing g^2 is provided with a screw g^4 , by removing which the lubricant can be run out.

The hole d for the knotted cord, as shown in Figs. 1 and 2, is cut through to the edge of the drum end, so that the cord can be readily inserted and removed.

The drum D is provided at its lower part with a projection d^2 , Figs. 2 and 4, which comes in contact with a screw-stop O^2 , which can be inserted into either side of the bridge O . At its upper part the drum D is provided with a projection d^3 , which actuates two rings Q Q^2 , each having on the lower side a tooth q q^2 , respectively, so that when the drum is reciprocated by the engine the two rings (of which the ring Q is graduated and the ring Q^2 is provided with a vernier q^3) are set apart by the projection d^3 on the drum an amount corresponding to the stroke of the drum.

The drum D is provided with a sleeve D^3 to constitute a bearing-surface for the integrating-wheel C . This sleeve can be raised or lowered to any desired position on the drum to change the point of contact with the wheel and is prevented from turning on the drum by a groove and feather d^4 , Fig. 1.

It is preferred, as shown in the drawings, to construct the apparatus so that when it is in its normal or starting position the plane of the integrating-wheel C is at an angle to or intersects the plane containing the axis of the

drum, as then the apparatus will serve for indicating vacuum as well as pressure.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In apparatus such as described, the combination of a drum with a dished integrating-wheel to cooperate therewith, a cranked shaft having its axis of rotation within the plane of the rim of the wheel and a bearing for the shaft within the dish of the wheel, substantially as described.

2. In apparatus such as described, the combination with an integrating wheel and counter, of a carriage for supporting them pivoted coaxially with the cylinder, substantially as hereinbefore described.

3. In apparatus such as described, the combination of a shaft with a crank having a boss to be fitted on said shaft and a crank-pin having a boss to be fitted on said crank, substantially as described.

4. In apparatus such as described, the combination of the piston-rod, with a slotted head having a split sleeve to be detachably fitted on the said piston-rod, and a shaft having a crank to work in said slotted head, substantially as described.

5. In apparatus such as described, the combination of a drum having a projection, with two rings, and means on the rings engaging opposite sides of the projection whereby the latter can turn the rings in relatively opposite directions, substantially as described.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

W. G. LITTLE.

C. W. G. LITTLE.

Witnesses:

HENRY DENIS HOSKINS,
JOHN EDWARD NEWTON.