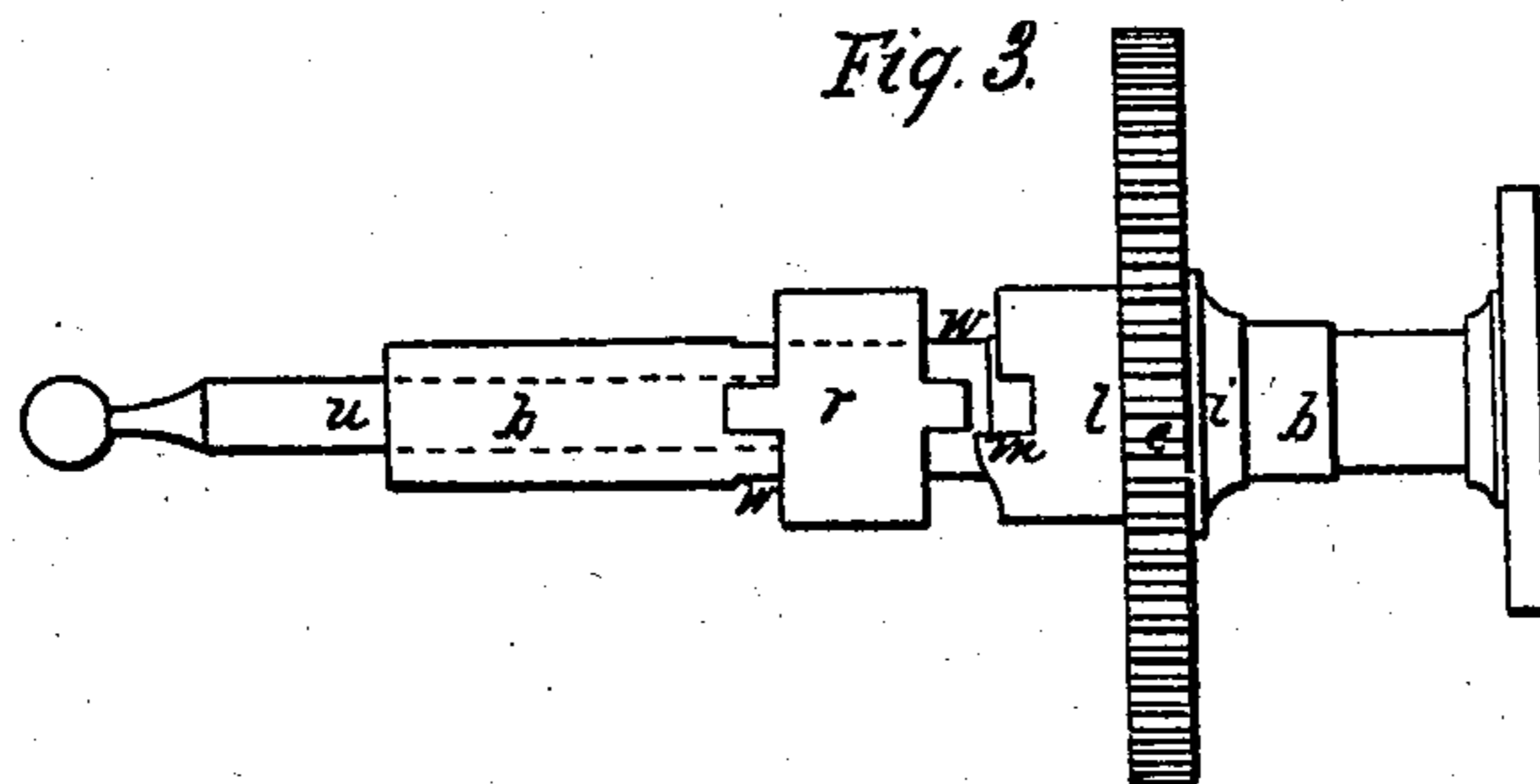
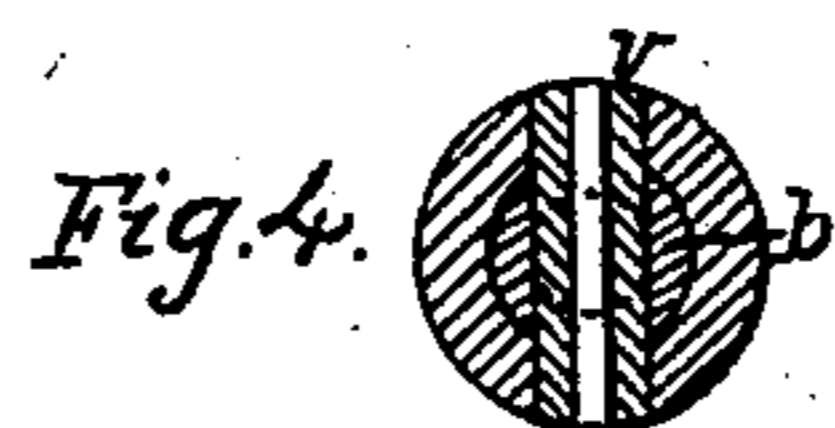
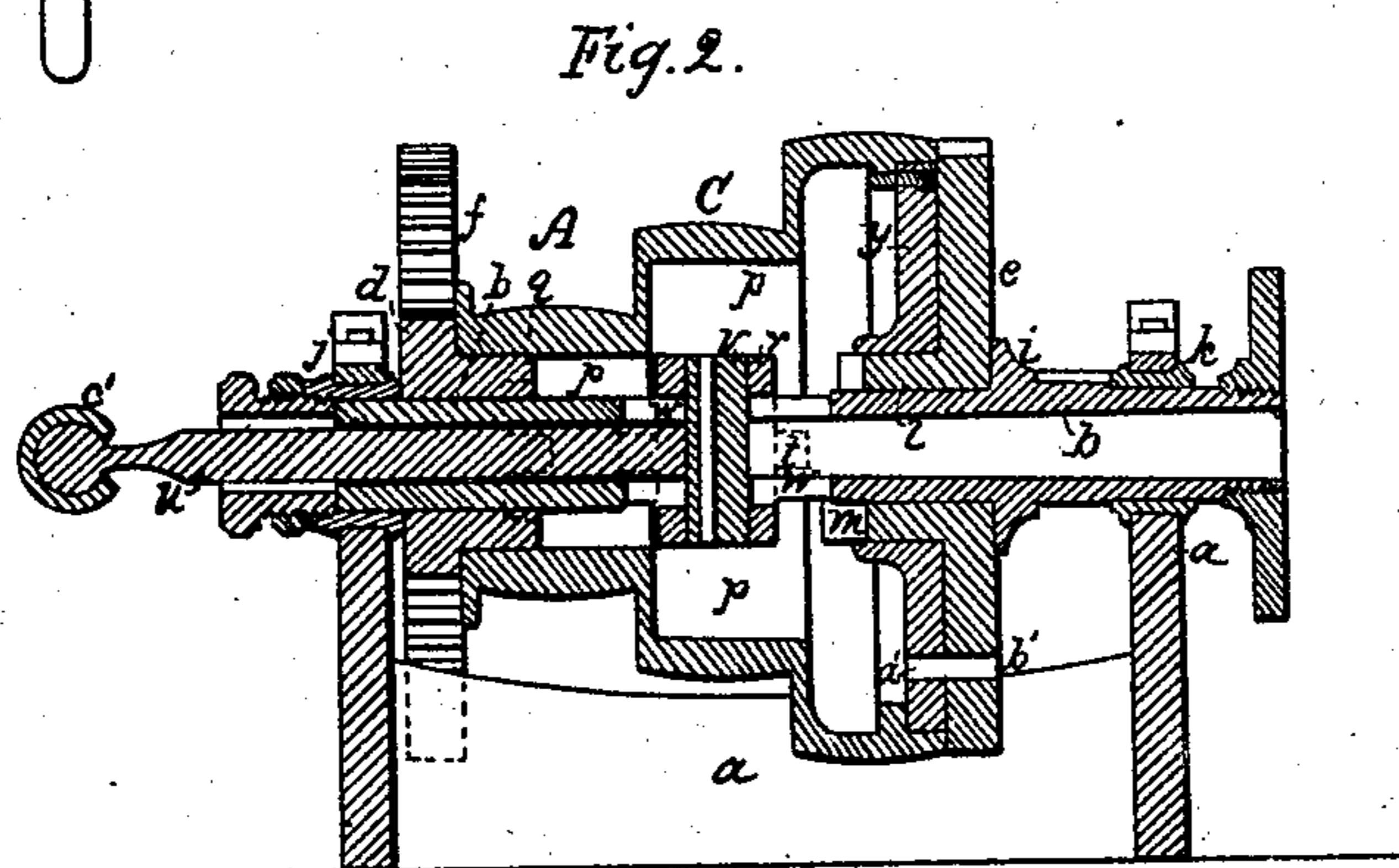
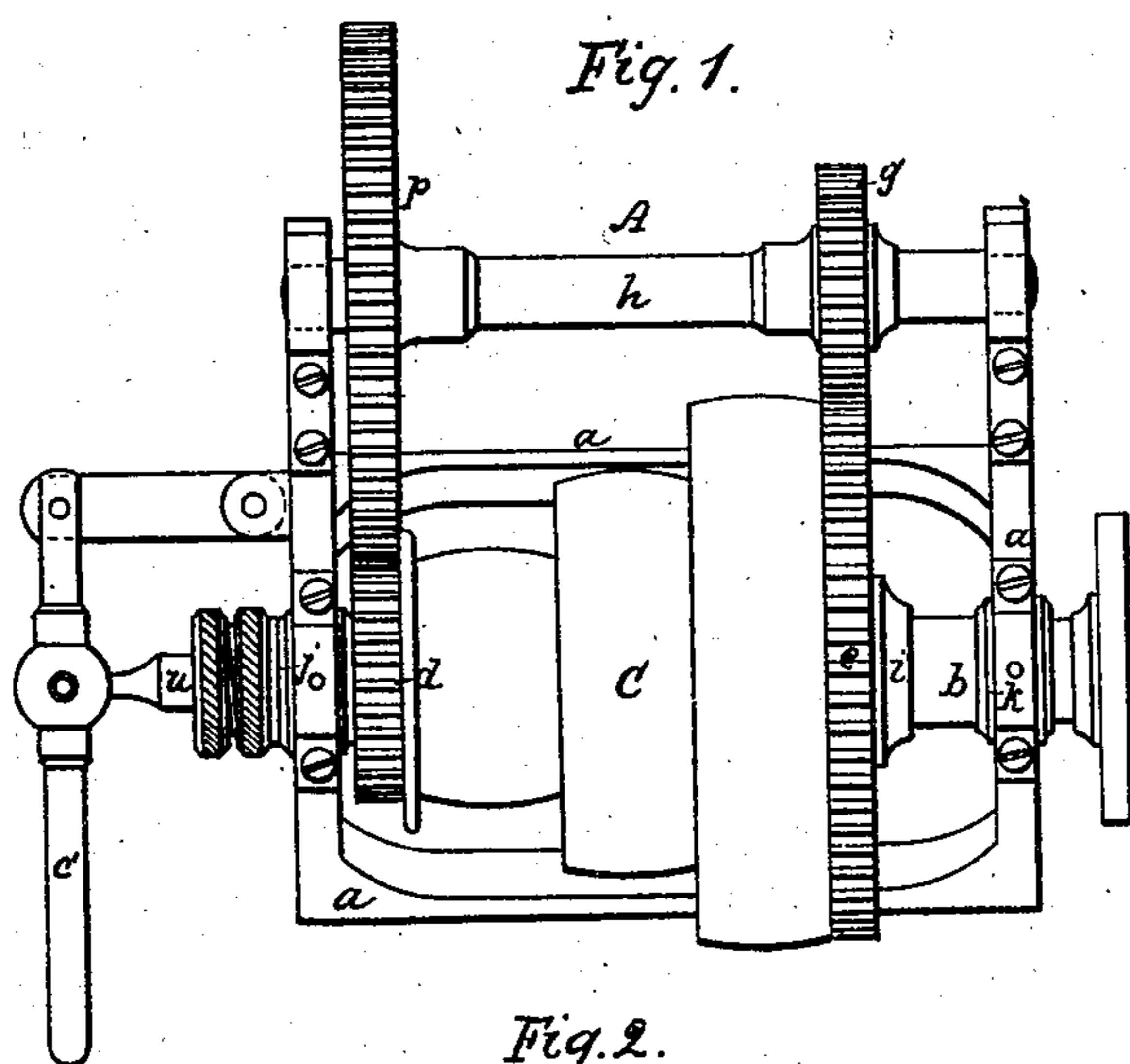


A. E. WHITMORE.
ENGINE LATHE.

No. 85,552.

Patented Jan. 5, 1869.



Witnesses.

Geo. A. Loring.
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Inventor.

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Frederick Curtis.

United States Patent Office.

ANDREW E. WHITMORE, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 85,552, dated January 5, 1869.

IMPROVEMENT IN ENGINE-LATHE.

The Schedule referred to in these Letters Patent and making part of the same.

To all to whom these presents shall come:

Be it known that I, ANDREW E. WHITMORE, of Boston, in the county of Suffolk, and State of Massachusetts, have made an invention of a new and useful Improvement in Engine-Lathes; and do hereby declare the following to be a full, clear, and exact description thereof, due reference being had to the accompanying drawings, making part of this specification, and in which—

Figure 1 is a plan, and

Figure 2, a vertical central and longitudinal section of my improvement, as applied to the head-stock of an engine-lathe.

Figure 3, a side elevation of the spindle and clutches, to be hereinafter described.

Figure 4 is a transverse section of the same.

This invention relates to means for instantaneously changing the speed of the arbor of an engine-lathe, without the necessity, as has heretofore been necessary, of stopping the revolution or running of the lathe, to accomplish it.

It is, of course, well known to all machinists, and most mechanics, that it becomes necessary often, and, in some classes of work, many times a day, to change the speed of a lathe from fast to slow, or *vice versa*, as the case may be, according as the lathe may be employed either for turning metal, which requires a slow rate of speed, or for polishing or finishing such metal, when a more rapid revolution is necessary. In engine-lathes, as heretofore constructed, this changing of speed has been a matter of considerable annoyance, as well as expenditure of time, as the motions of the lathe must first be stopped, and the change effected by the use of a wrench, in the hands of the workman, several semi-revolutions of the pulley and arbor of the lathe being necessary to adjust the parts.

The general characteristics of the head-stock to which my invention is applied are the same as in ordinary engine-lathes; that is to say, an arbor is employed, provided with a driving-pulley, and with a train of differential gears, substantially as in ordinary lathes, as will be understood by machinists in general, and to whom further description of the ordinary head-stock and its accompaniments will not be necessary.

My invention consists in applying the large gear of the arbor, in an independent manner thereto, and in providing such gear, or its inner hub, with a semi-clutch, to act at intervals in connection with an intermediate or central clutch, applied to a rod sliding within the bore of the arbor, such clutch sliding longitudinally upon the periphery of the arbor, but revolving with it, and acting in connection with a second semi-clutch, fixed to or making part of the small gear of the arbor, and disposed concentrically about the periphery of such arbor, in manner to be explained, the arrangement of parts being such, that, upon pushing the clutch-rod inward, the large gear is coupled to the arbor, and re-

volves with and drives such arbor at a reduced rate of speed, while, upon drawing out such rod, the connection of the large gear with the arbor is released, and the central clutch locked into connection with the small gear and the pulley, by which means an increased rate of speed is produced, the central clutch, when standing at an intermediate point between the two semi-clutches, ceasing to actuate either; the construction and operation of the whole being hereinafter referred to and explained.

Reference being had to the accompanying drawings, before mentioned as illustrating my invention, it will be seen that A denotes the head-stock of an engine-lathe, of which *a* is the frame, *b*, the arbor, *c*, the pulley, *d*, the pulley-gear, *e*, the spindle-gear, and *f*, *g*, the back differential gears, applied to the frame by a shaft, *h*; the above-described arrangement of parts being substantially the same as in engine-lathes of ordinary construction.

In carrying out my invention, I apply the larger or spindle-gear *e*, to the spindle or arbor *b*, in such manner that it shall revolve and slide freely thereon, except at such times as it may be locked thereto, as hereinafter explained, a collar, *i*, being fixed to the arbor, between one of its supporting-boxes, *j*, *k*, and the gear, to prevent misplacement of the latter.

The gear *e* has a hub, *l*, extending inward from it, such hub having a female semi-clutch, *m*, formed upon its inner end, as represented.

The "pulley-gear," as it is termed by mechanics, is shown at *f* as affixed to or making part of the pulley of the latter, such pulley being shown at *c*, in the drawings, as before stated.

The interior of the pulley *c* is hollow or chambered, as shown at *p* in the drawings, in order to receive loosely the clutches of the device, the rear, or outer end, or bottom of such chamber *p* being formed with a female semi-clutch, *q*, similar in size and construction to the semi-clutch *m* before mentioned.

Furthermore, a sleeve, *r*, encompasses the arbor *b*, and slides loosely thereon, such sleeve having notches upon each end, corresponding in size and position with those of the semi-clutches *m* and *q*, and, by this means, being converted into the central locking-portion, or male clutch, of the device, it being disposed between the said semi-clutches as shown, the space between such clutches being considerably longer than the extreme length of the said central clutch.

The arbor *b*, nearly or quite its entire length, is tubular, as shown at *t*; and within this bore, from its rear end, is extended a rod or stem, *u*, such rod being fixed to the tubular sleeve *r*, before mentioned, a spline or bar, *v*, extending from such sleeve into and through slots *w* made through opposite sides of the arbor, and communicating with its bore, and being of such a disposition and length with respect thereto as to permit of free-sliding movements of the sleeve upon the ar-

bor, between the semi-clutches *m* and *q*, before mentioned, at the same time causing the sleeve to revolve with the arbor.

It may be well to call the reader's attention to the fact that the end of the driving-pulley *c*, next adjacent to the spindle-gear *e*, is closed by a disk, *y*.

When it becomes necessary to detach a chuck or face-plate, which may be at the time screwed upon the arbor, a pin is to be inserted within holes *a'* *b'* made through the gear *e* and the said disk *y*, in alignment with each other, thus locking the gear *e* to the pulley, and allowing the chuck or face-plate to be unscrewed from the arbor.

The rear extremity of the rod *n* is extended some distance beyond that of the arbor *b*, and is provided at such extremity with a suitable device for imparting longitudinal movements to it in either direction.

The device shown in the present instance is simply a lever, *c'*, pivoted at its rear end to the frame of the head-stock, and swivelled to the rod *n* by a ball-and-socket or other suitable joint or connection.

It will be obvious that upon pushing the rod *n* inward to its greatest extent of movement, the central clutch or sleeve *r* will be caused to slide longitudinally upon the arbor, and locked to the larger or spindle-gear *e* by its clutch *m*, and consequently detached from connection with the pulley-clutch, thus, by means of the differential back gears *f* and *g*, causing a slow or greatly-reduced rate of speed of the arbor, compared with that of the pulley which at this time is driving it.

Vice versa, by pulling the rod *n* outwards to its extreme limit, the central clutch *r* will be locked to the semi-clutch *q*, and consequently to the pulley *c*, and its gear *d*, thus allowing the said gear *d* to rotate the back gears *f* and *g*, without any effect upon the arbor, as the gear *e*, at this time, is free, and rotating loosely about such arbor, and allowing it to be revolved

by and at the same rate of speed with the pulley, or at a greatly-increased rate of speed over that allowed by the last-mentioned condition of parts.

Although not herein represented, the head-stock is to be provided with the usual means of entirely disconnecting the back gears *f* and *g* from the pulley-gear when the arbor is to be driven directly by the pulley, it being, of course, understood that the object of reducing the rate of speed of the arbor, by means of the said gears *f* and *g*, is to increase the power over such arbor.

The foregoing description will enable mechanics of general acquirements to construct and use my invention.

Such persons will appreciate the value of the invention, allowing, as it does, the speed of the lathe to be instantaneously, and with very little effort, varied, as occasion requires, without cessation of its rotation. In an establishment employing a large number of workmen, this economy of time will be found a matter of great value.

I claim as my invention, and desire to secure by Letters Patent of the United States, as follows:

In a head-stock, such as described, I claim the combination, with the driving-pulley and pulley-gear, the spindle-gear *e*, and the differential gearing, of the tubular spindle *b*, the half clutches *m* and *q*, formed on the gears *d* and *e* respectively, the sliding clutch *r*, and the rod *n*, connected with and operating said clutch, and supported in the tubular spindle, as specified, said parts being constructed and arranged substantially in the manner shown and set forth.

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Witnesses:

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