No. 630,299. Patented Aug. 1, 1899.

W. MOON.

SPEED INDICATOR.

(Application filed Mar. 31, 1898.)

(No Model.)

Fig. 1.

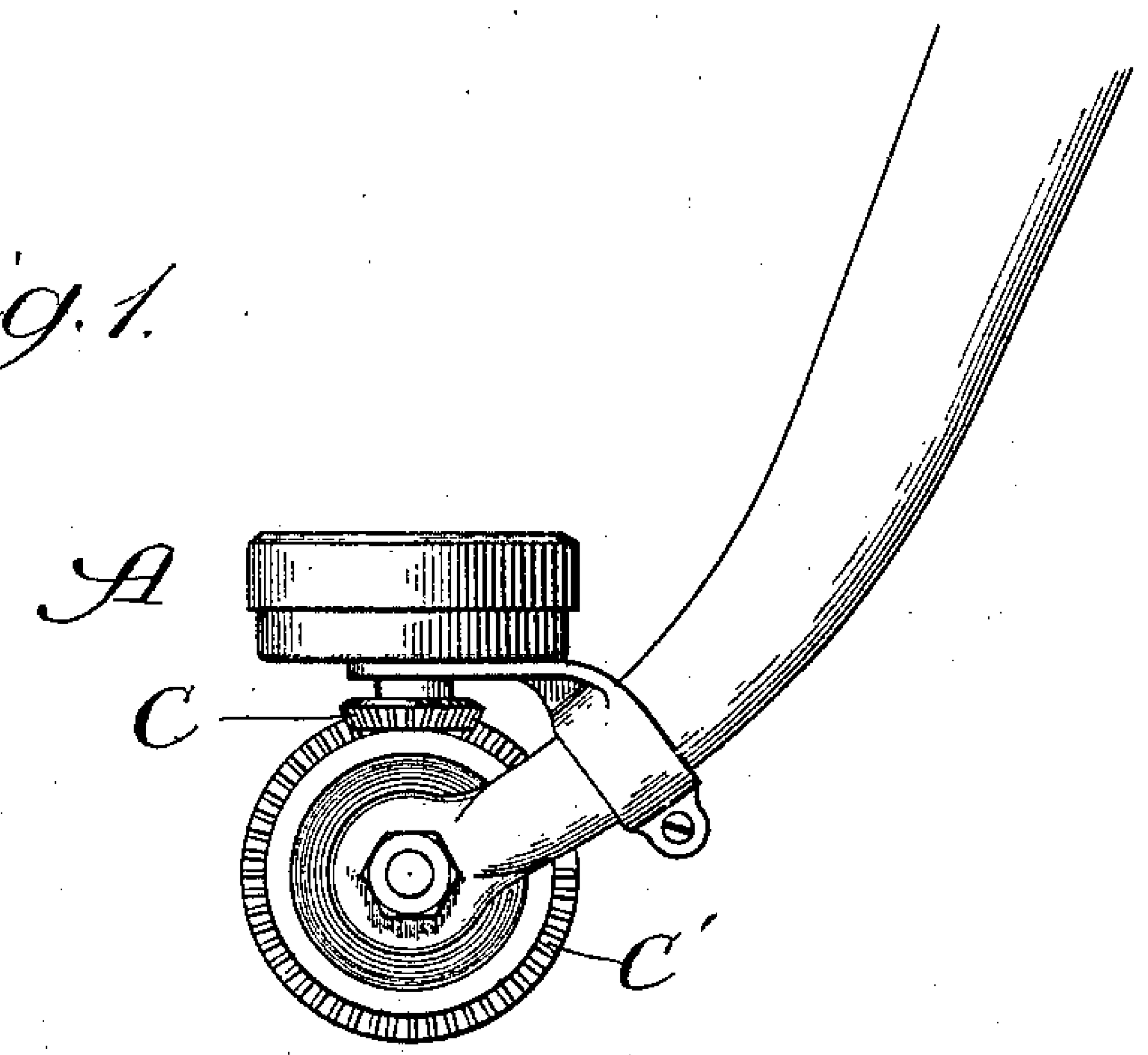


Fig. 2.

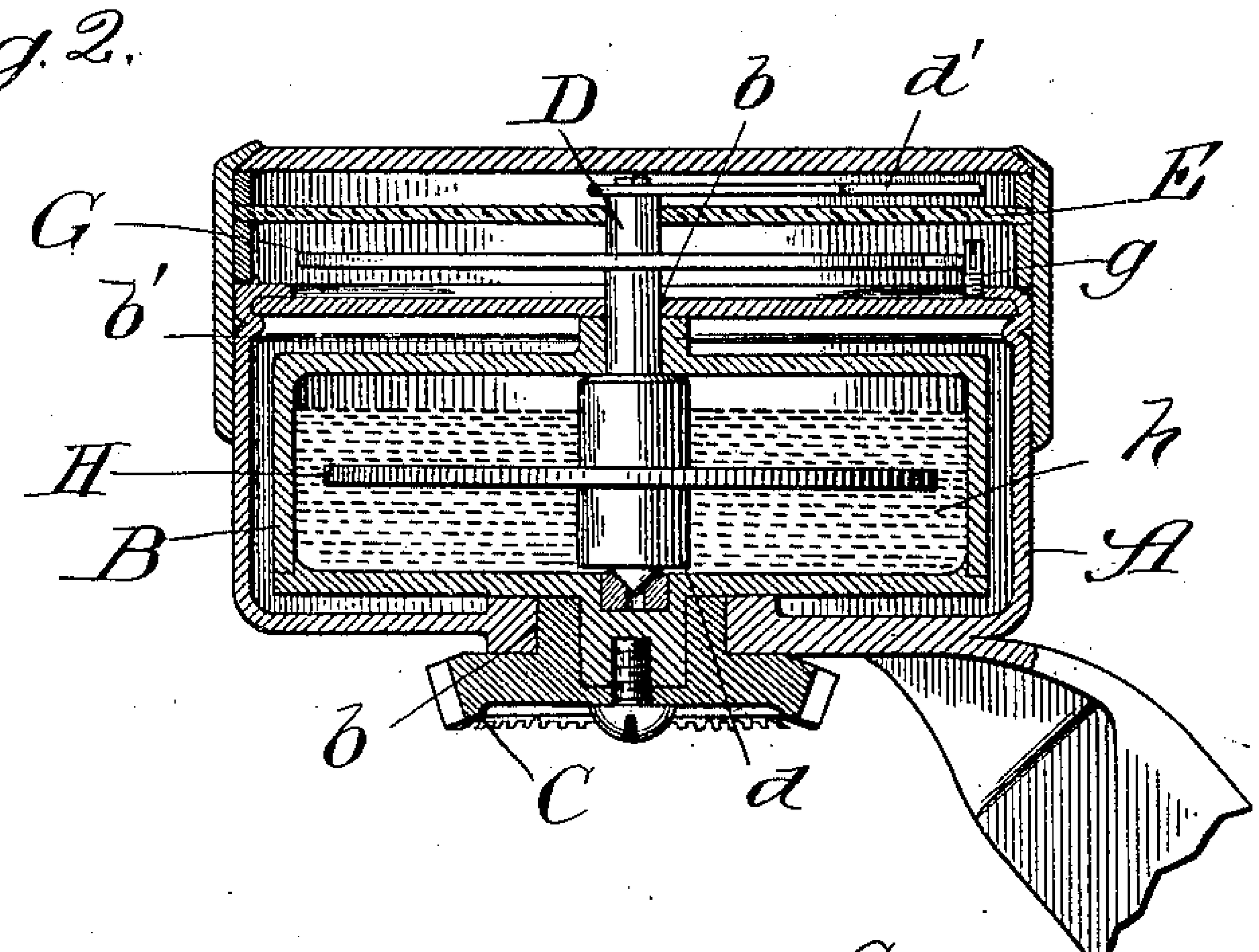


Fig. 3.

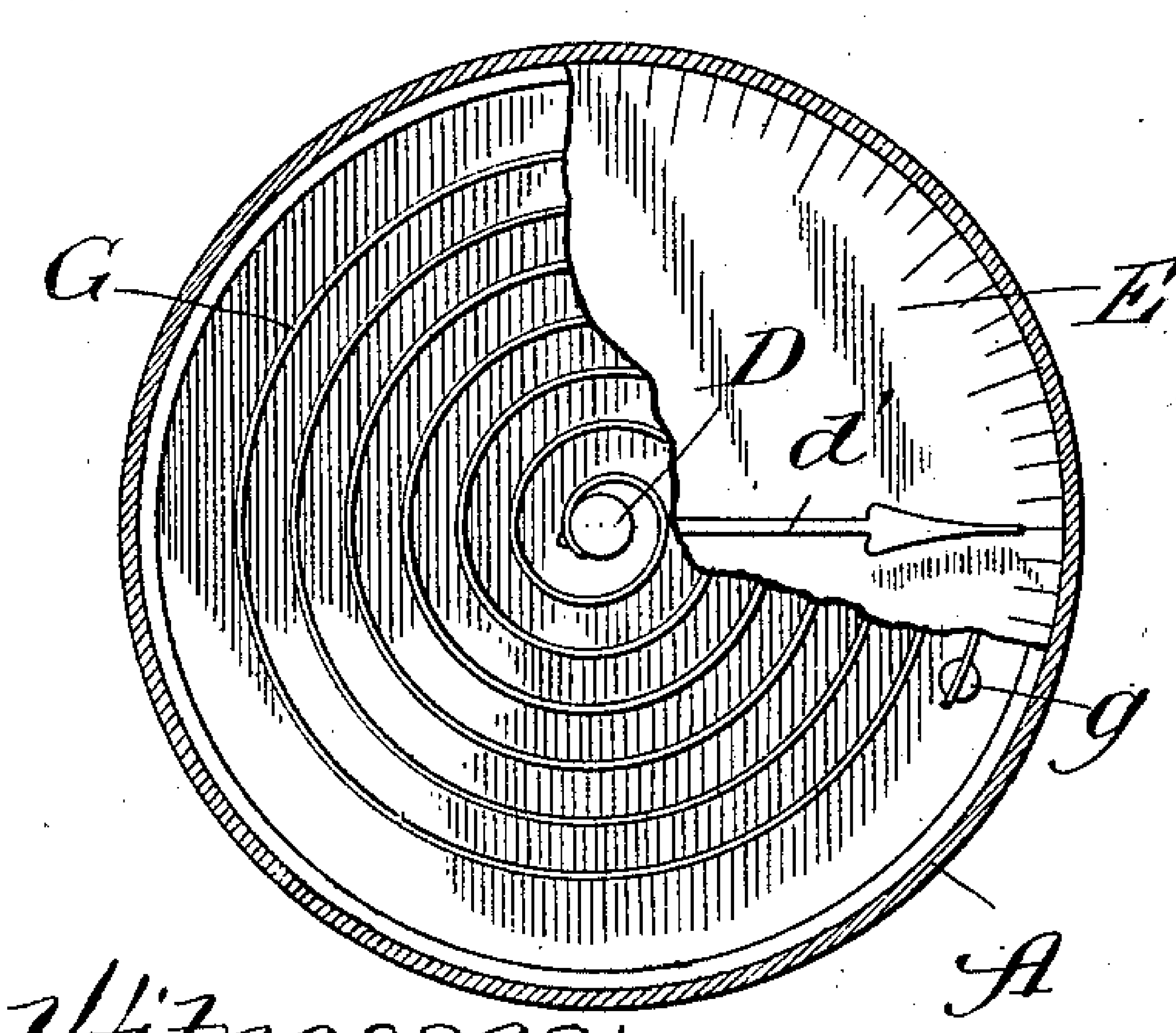
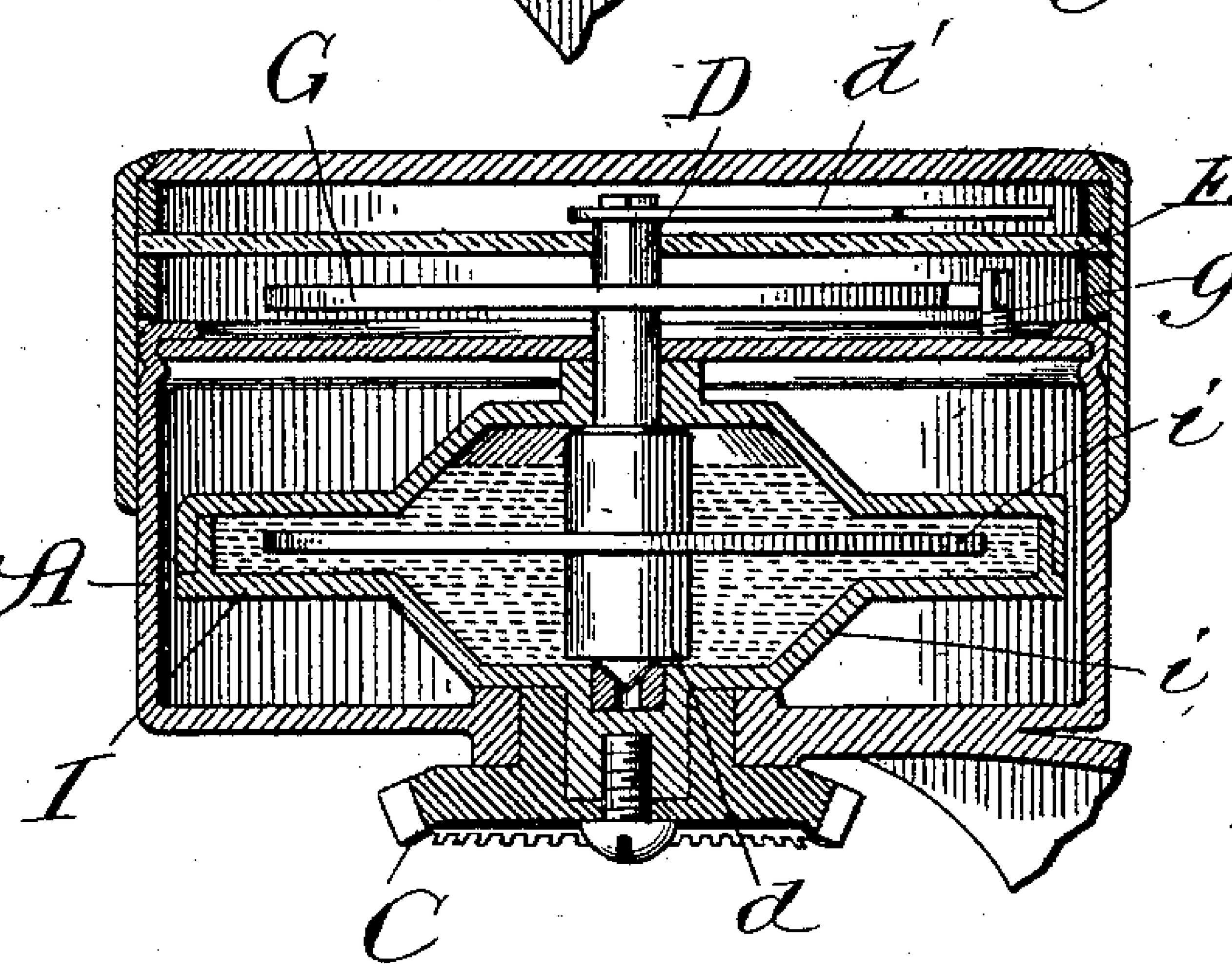


Fig. 4.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WARREN MOON, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE CONSTRUCTION AND MAINTENANCE COMPANY, OF SAME PLACE.

SPEED-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 630,299, dated August 1, 1899.

Application filed March 31, 1898. Serial No. 675,884. (No model.)

To all whom it may concern:

Be it known that I, WARREN MOON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Speed-Indicators, of which the following is a specification.

My invention relates to that class of indicators that are used for the purpose of indicating the speed at which a shaft is rotating as contradistinguished from the class of indicators that indicate the number of rotations or revolutions that a shaft is making per minute.

The object of my invention is to provide a simple, economical, and efficient speed-indicator; and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of an indicator embodying my improvements, shown as it appears in position when used in connection with a bicycle of the safety type; Fig. 2, an enlarged sectional view taken through the center of the apparatus, showing one form in which my invention may be embodied; Fig. 3, a plan view of the machine with a portion of the dial broken away, showing the tension-spring; and Fig. 4, an enlarged sectional elevation of a modified form of instrument embodying my improvements.

In the art to which this invention relates it is well known that it is desirable for the rider of a velocipede or the operator of a high-speed machine—such as silk machinery, &c.—to be kept informed as to the comparative speed at which the machine is running at all times and not wait until the machine has attained a certain speed before he is informed. The principal object of my invention, therefore, is to provide a machine which will accomplish these results.

In constructing a machine or instrument in accordance with my improvements I make a main casing A of the desired size, shape, and strength to inclose and hold the operative and other mechanisms in place and at the same time protect them from dirt and foreign substances. Inside of this main case I make what I term a "rotatable cylinder" B, which has its journal *b* in the main casing, and preferably arrange the rotatable cylinder in an inclosed chamber *b'*. This cylinder B is what might be termed a "retarding-cylinder," in which material is kept for the purpose of developing centrifugal force and acting with a retarding effect, as will be hereinafter more fully set forth. This retarding-cylinder is preferably provided with a beveled pinion C, which may be engaged with a driving-gear C', placed on a rotating shaft or hub of a bicycle-wheel, as may seem necessary, and which when the machine is in motion gives a rotary movement to the retarding-cylinder.

To indicate the speed at which the machine is running, an indicating-staff D is provided, having its body portion *d* located within the retarding-cylinder and its upper portion projecting therethrough and provided with an indicating-hand *d'*, arranged above a dial E. This indicating-staff is loosely or independently mounted in the rotatable retarding-cylinder, so that such cylinder may have independent rotations. In order to hold the indicating-hand at zero or a normal point, a spiral tension-spring G is provided, which has one end secured to the indicating-staff and the other to a spring-stud *g*, fixed to some portion of the case and in which the spring may be adjustably secured for the purpose of obtaining the desired tension. In order to operate this engaging hand when the retarding-cylinder is under motion, a retarding disk or plate H is provided and rigidly secured or fixed in any desired way to the indicating-staff inside of the retarding-cylinder, so that a body of liquid *h* may have its effect thereon.

In the figures of the drawings I have shown the material located inside of the retarding-cylinder as being a liquid; but it will be understood that it is not necessary to use a liquid, for the reason that comminuted particles of solids may be used—such as graphite, plumbago, small shot, and the like—all of which will be more fully hereinafter explained.

In Fig. 2 of the drawings I have shown one form in which my invention may be embodied, in which a cross-section of the retarding-cylinder resembles a rectangle. This form is preferable when comminuted particles of solid

material—such as plumbago or small shot, or both—are used. It is desirable, however, in order to overcome the expansion and contraction of the materials, evaporation of liquids, &c., due to rising and falling temperatures, to provide for the use of mercury or quicksilver; but as this material is expensive when compared with other materials it is desirable to use it in as small a space as possible for the purposes of economy.

In Fig. 4 I have shown a modified form of my instrument which resembles in all respects the instrument shown in Fig. 2, with the exception that the retarding-cylinder I is enlarged at the central portion *i*, so as to form what might be termed an "expansion-chamber," having a contracted channel or groove *i'* at the peripheral portion.

In operation rotation is imparted from the shaft to the retarding-cylinder, which immediately develops centrifugal force and carries the liquid, comminuted particles, or other materials to the outer peripheral point, where it is in a measure compressed on the periphery of the retarding-disk or, in other words, clamps the retarding-disk between it under pressure. This action has a tendency to rotate the indicating-staff and carry the indicating-hand around on the dial until it is counterbalanced by the tension-spring, and thus indicates at about what speed the shaft is running. It will thus be seen that when my instrument is in operation there are two forces at work—first, a centrifugal force on the liquid or materials, and, second, a frictional force on the retarding disk or plate. In Fig. 4 when the mercury is used it will be seen that the body of it fills the expansion-chamber at or near the center of the retarding-cylinder, so that when centrifugal force is developed it forces out the fluid into the narrow annular channel to have a retarding effect on the retarding disk or plate.

The principal advantage incident to the use of an instrument constructed in accordance with my improvement is that it will begin to indicate at very low speeds—from about five revolutions up to several thousand.

While I have described my invention with more or less minuteness as regards details of construction and operation and as being embodied in certain precise forms, I do not desire to be limited thereto unduly any more than is pointed out in the claims. On the contrary, I contemplate all proper changes in form, construction, and arrangement, the omission of immaterial elements, and the substitution of equivalents as circumstances may suggest or necessity render expedient.

I claim—

1. In an instrument of the class described, the combination of a rotatable cylinder, and a staff independently mounted in such cylinder, means for developing centrifugal and frictional force between the staff and the rotatable cylinder during the rotations of the cylinder, substantially as described.

2. In an instrument of the class described, the combination of a rotatable cylinder, a staff independently mounted in such cylinder, a disk secured to such staff and within the rotatable cylinder, and means for developing centrifugal and frictional force between the disk and the rotatable cylinder during the rotations of the cylinder, and tension mechanism secured to the indicating-staff to compensate and gradually overcome the frictional force of the staff, substantially as described.

3. In an instrument of the class described, the combination of a rotatable cylinder, a staff independently mounted in such cylinder, a disk secured to such staff and within the rotatable cylinder, means for developing centrifugal and frictional force between the disk and the rotatable cylinder during the rotations of the cylinder, an indicating-hand on such staff, an inclosing frame or case, and a spiral spring secured to the staff and to the frame or case to gradually overcome the frictional force, substantially as described.

4. In an instrument of the class described, the combination of a rotatable cylinder, a staff independently mounted in such cylinder, a disk secured to such staff and within the rotatable cylinder, a fluid body in such rotatable cylinder adapted when the cylinder is rotating to be subjected to centrifugal force and frictionally engage the diaphragm or disk on the indicating-staff, an inclosing case for such rotating cylinder, an indicating-hand on the staff, and a spiral spring connected with the staff and with the frame or case to gradually overcome the developed frictional force, substantially as described.

5. In an instrument of the class described, the combination of a rotatable cylinder, a staff independently mounted in such cylinder, a disk secured to such staff and within the rotatable cylinder, a body of mercury in such rotatable cylinder adapted when the cylinder is rotating to be subjected to centrifugal force and frictionally engage the diaphragm or disk on the indicating-staff, an inclosing case for such rotating cylinder, an indicating-hand on the staff, and a spiral spring connected with the staff and with the frame or case to gradually overcome the developed frictional force, substantially as described.

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