

(No Model.)

3 Sheets—Sheet 1.

H. BEHRENS.
VARIABLE SPEED GEAR.

No. 598,762.

Patented Feb. 8, 1898.

Fig. 1.

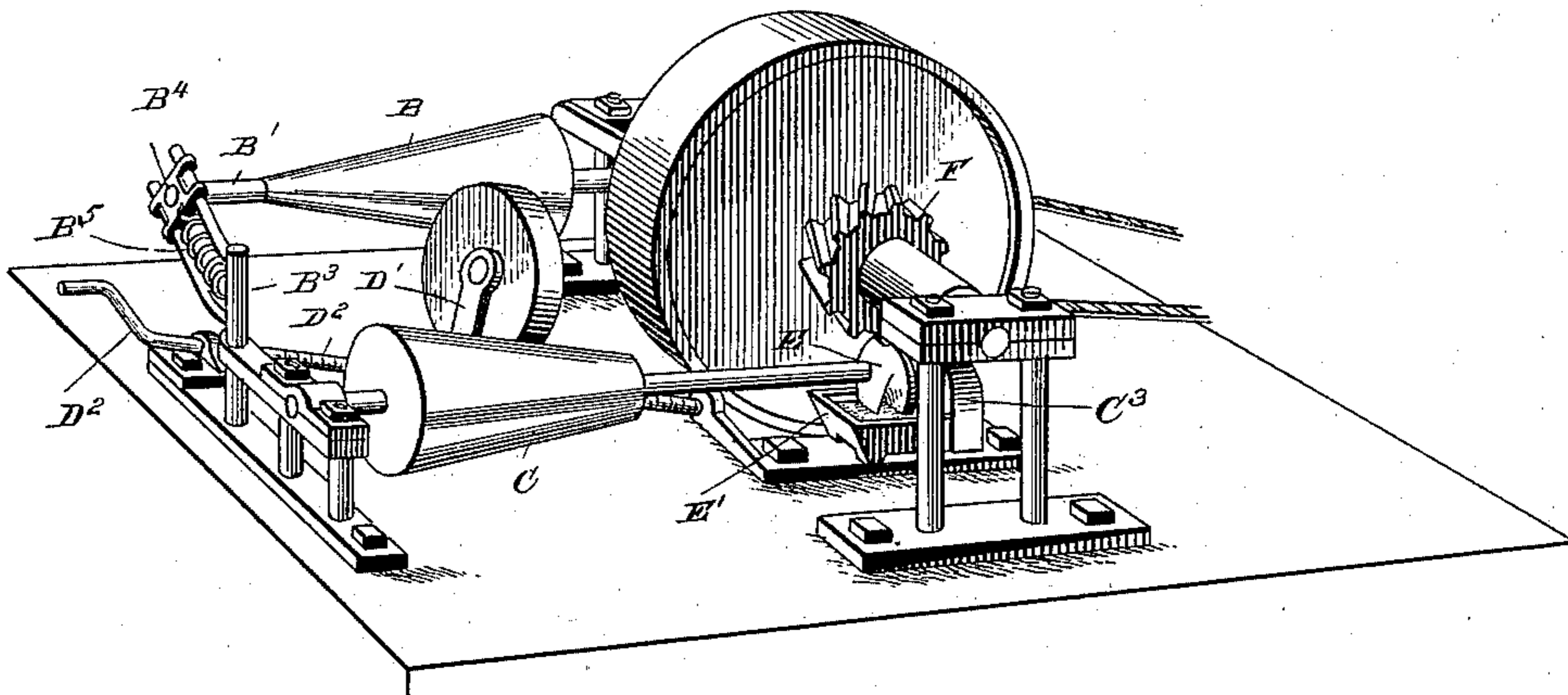


Fig. 2.

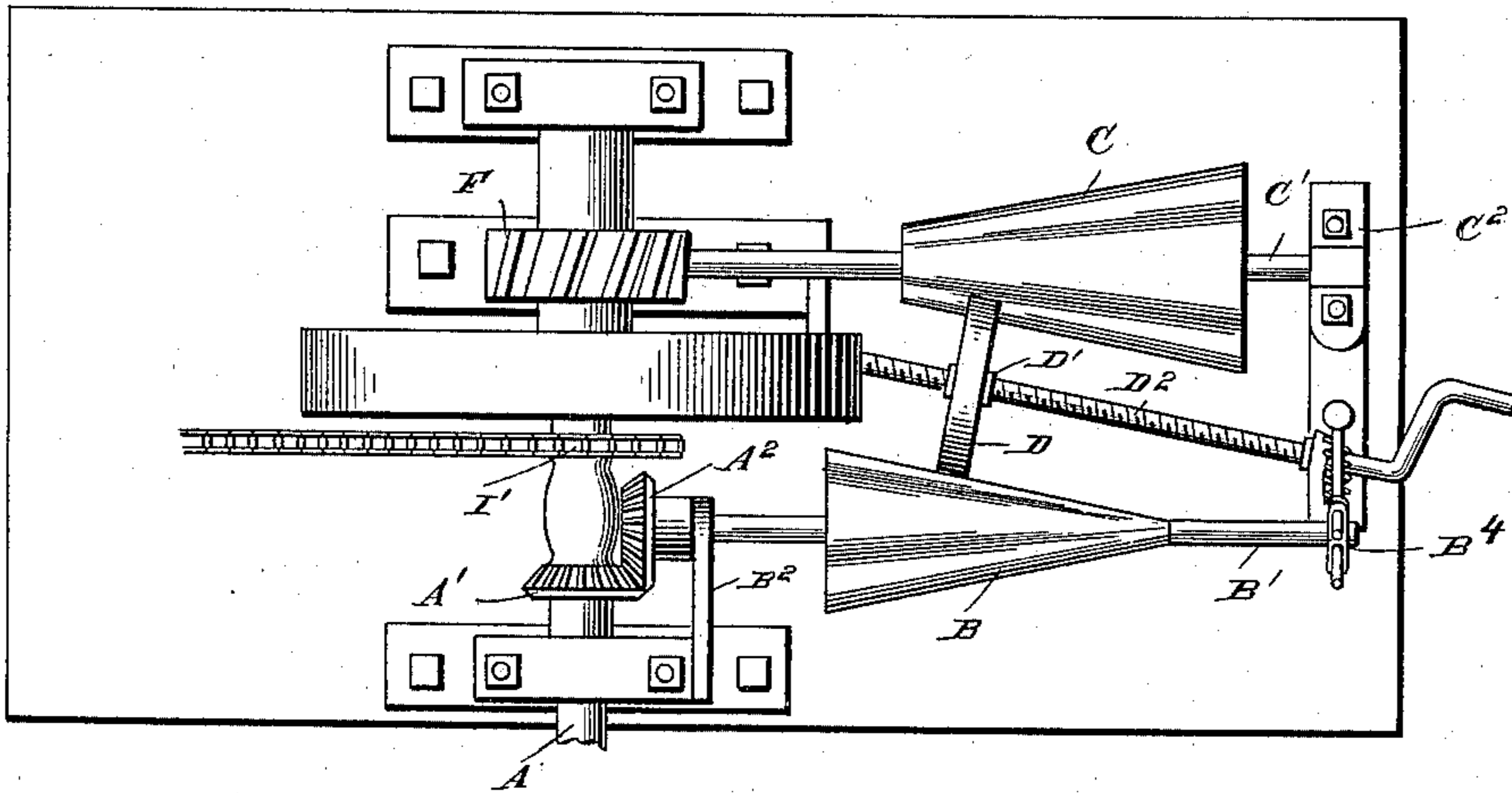
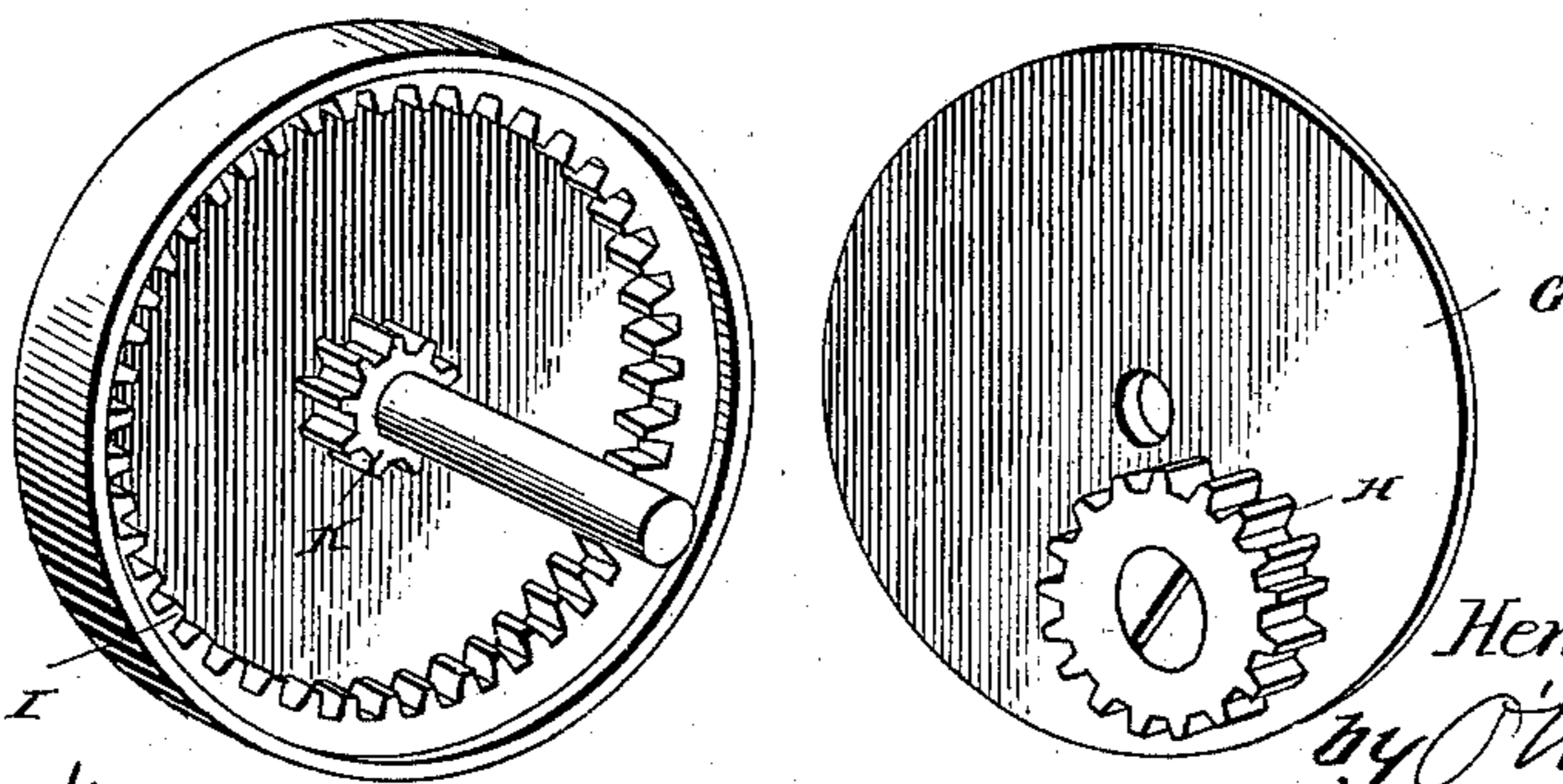


Fig. 3.



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Fig. 4.

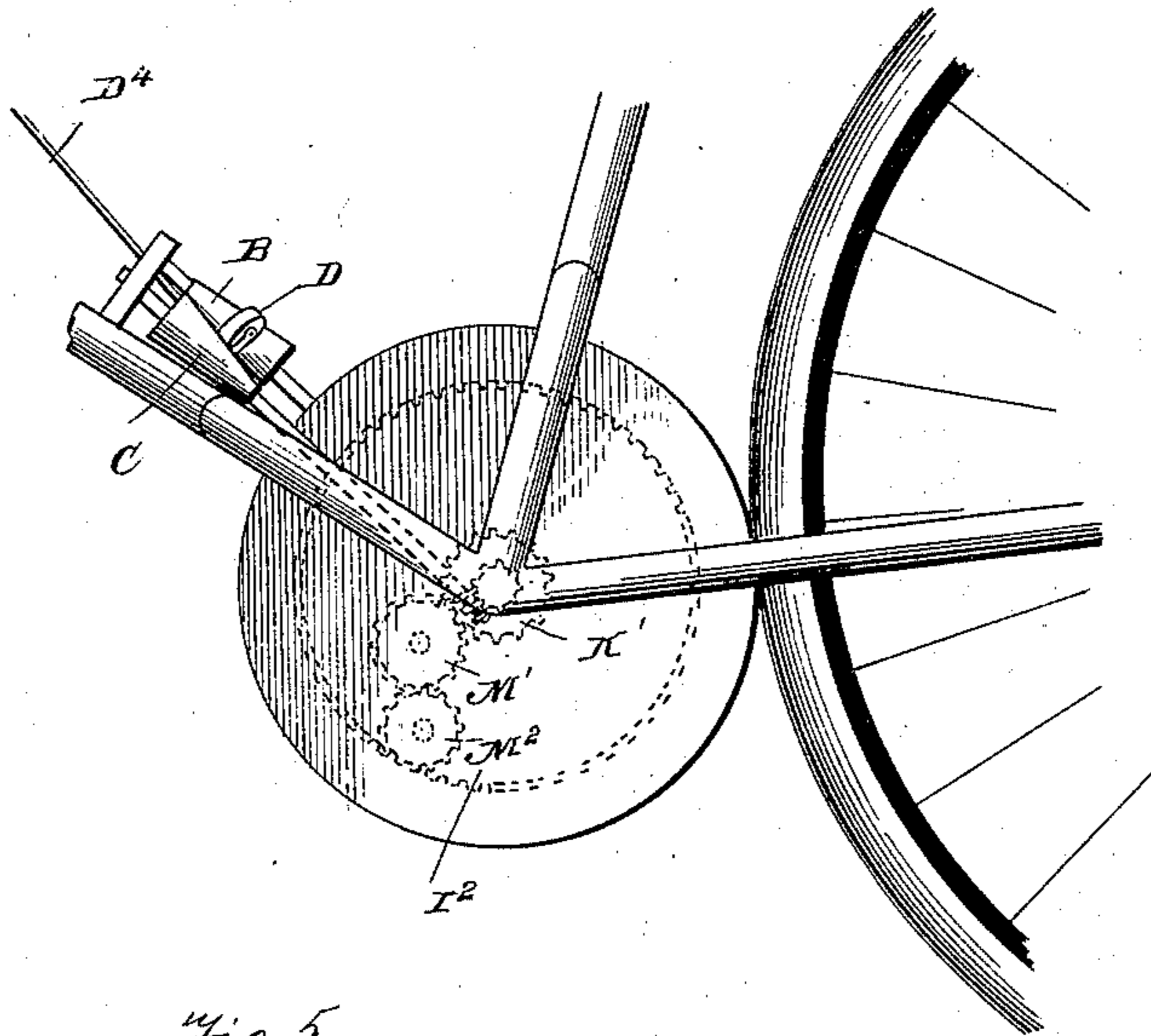


Fig. 5.

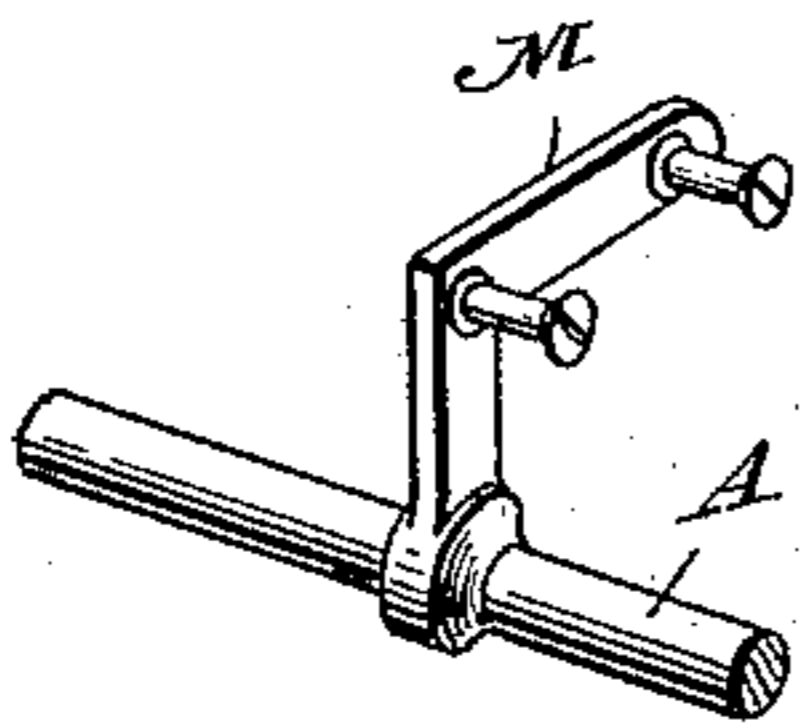


Fig. 6.

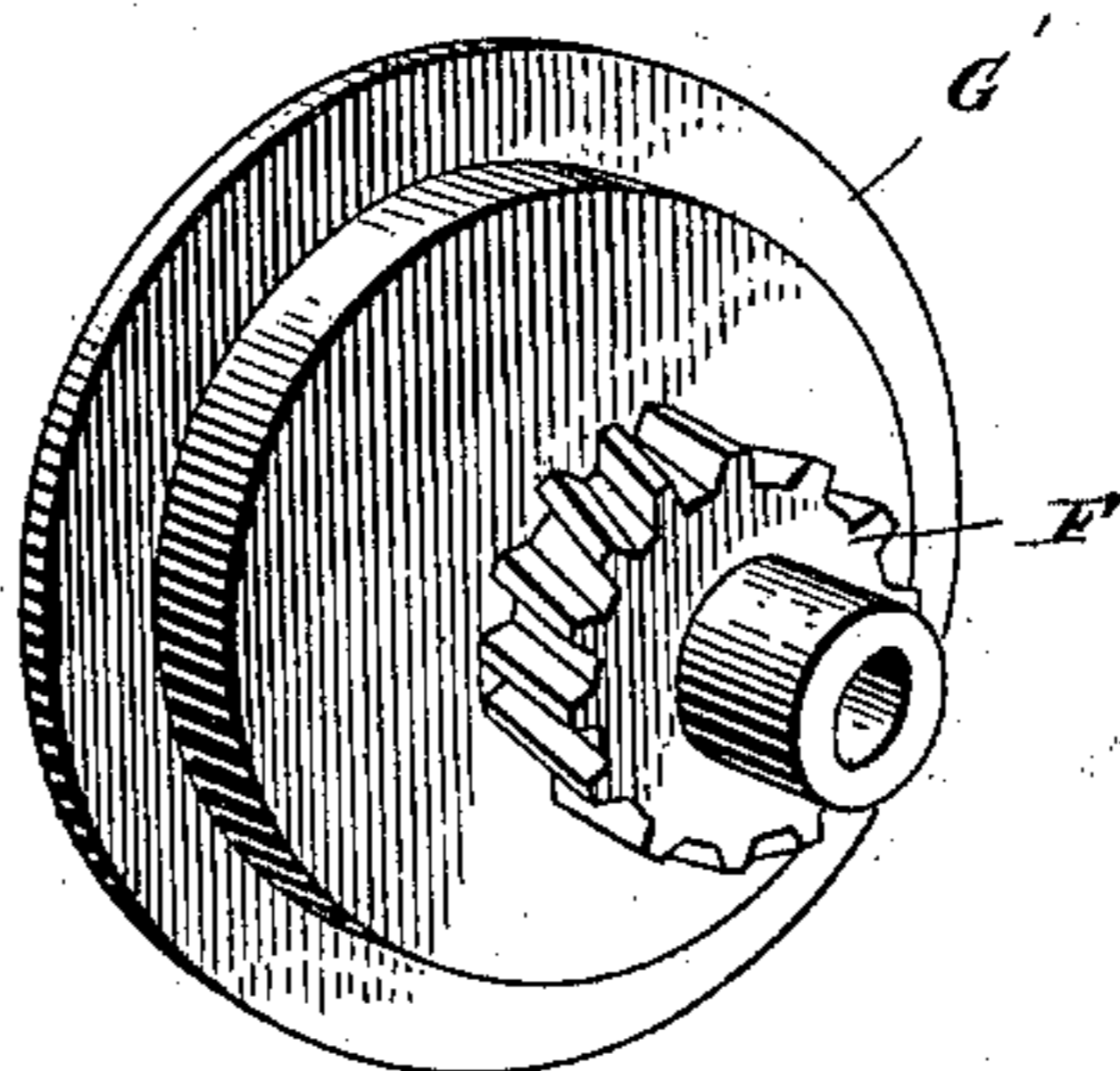


Fig. 7.

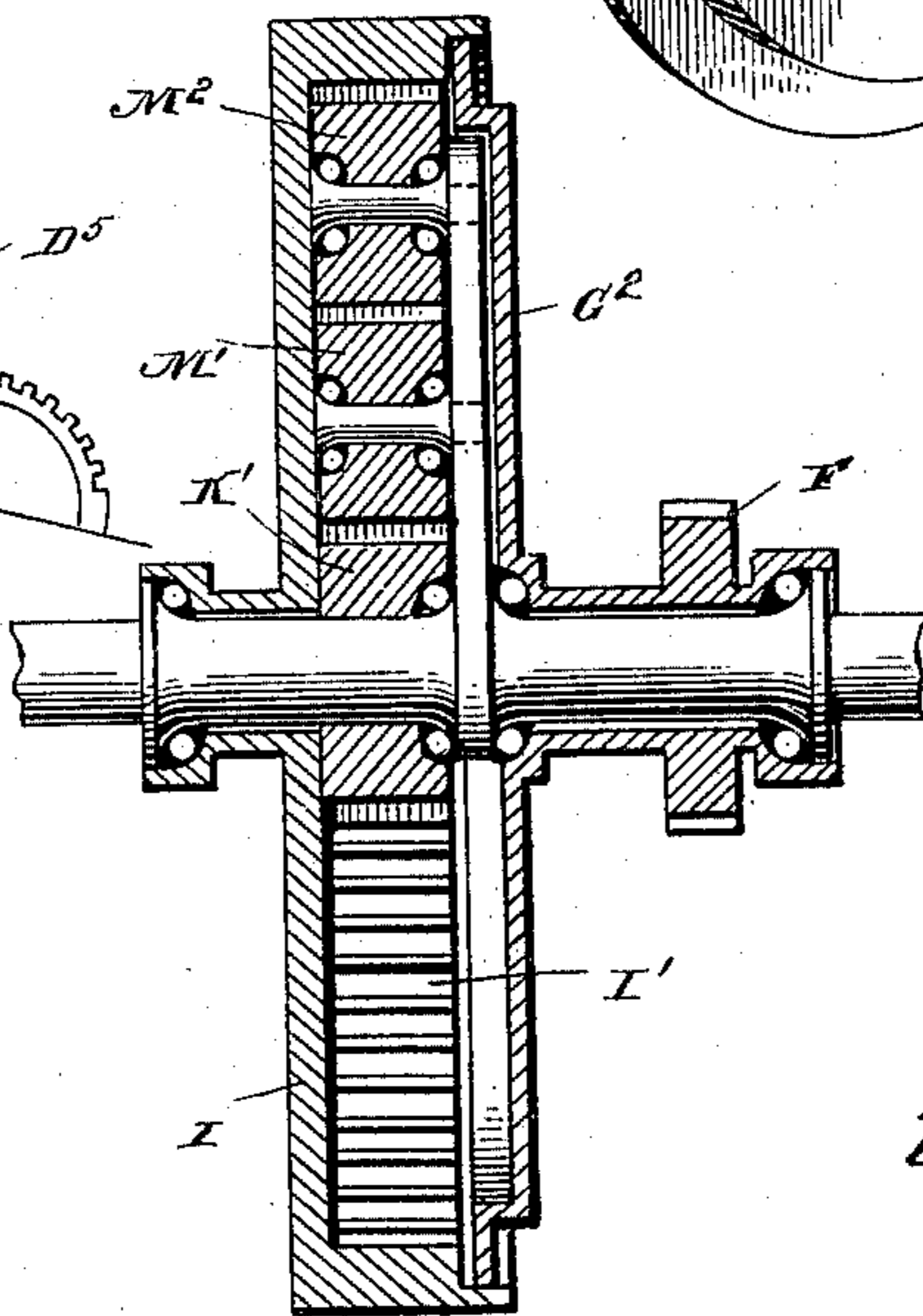
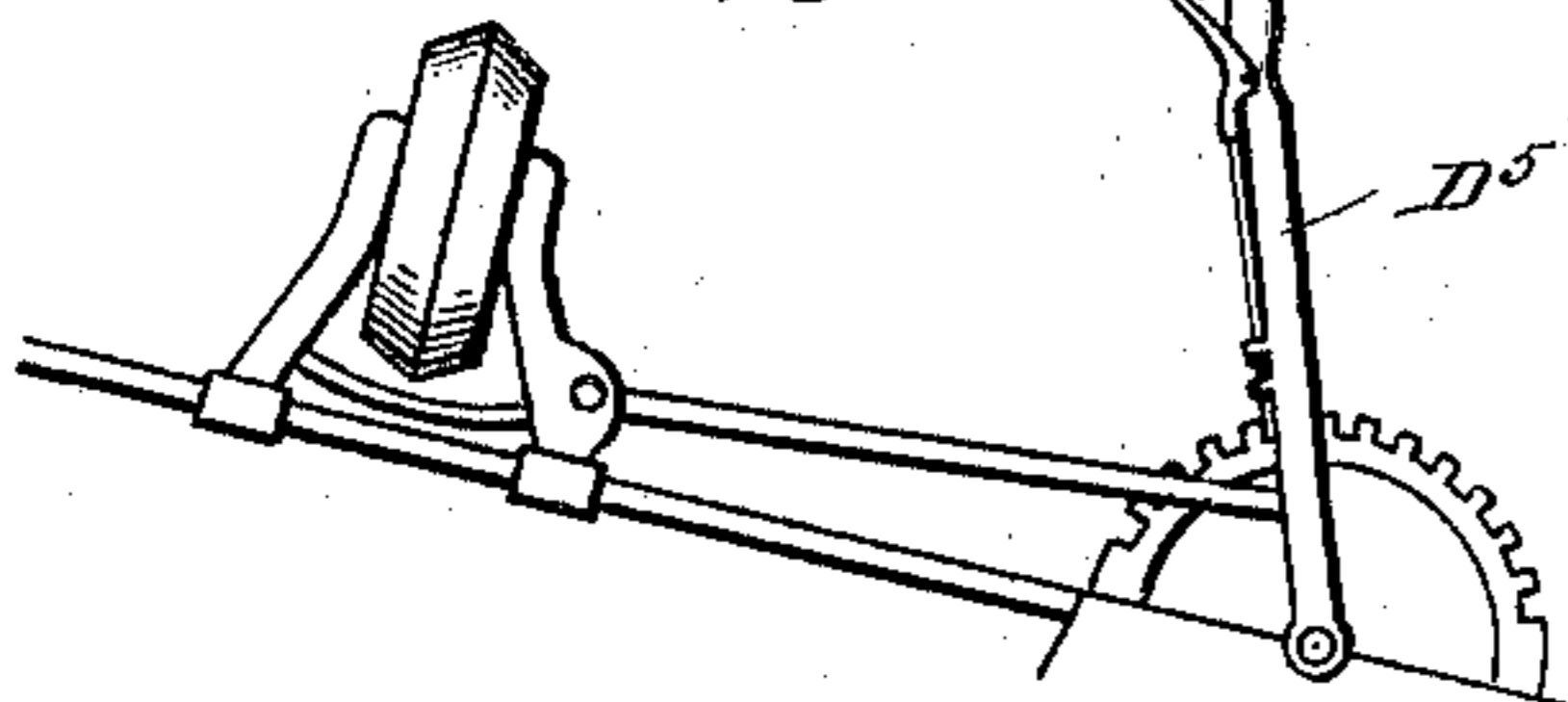


Fig. 8.



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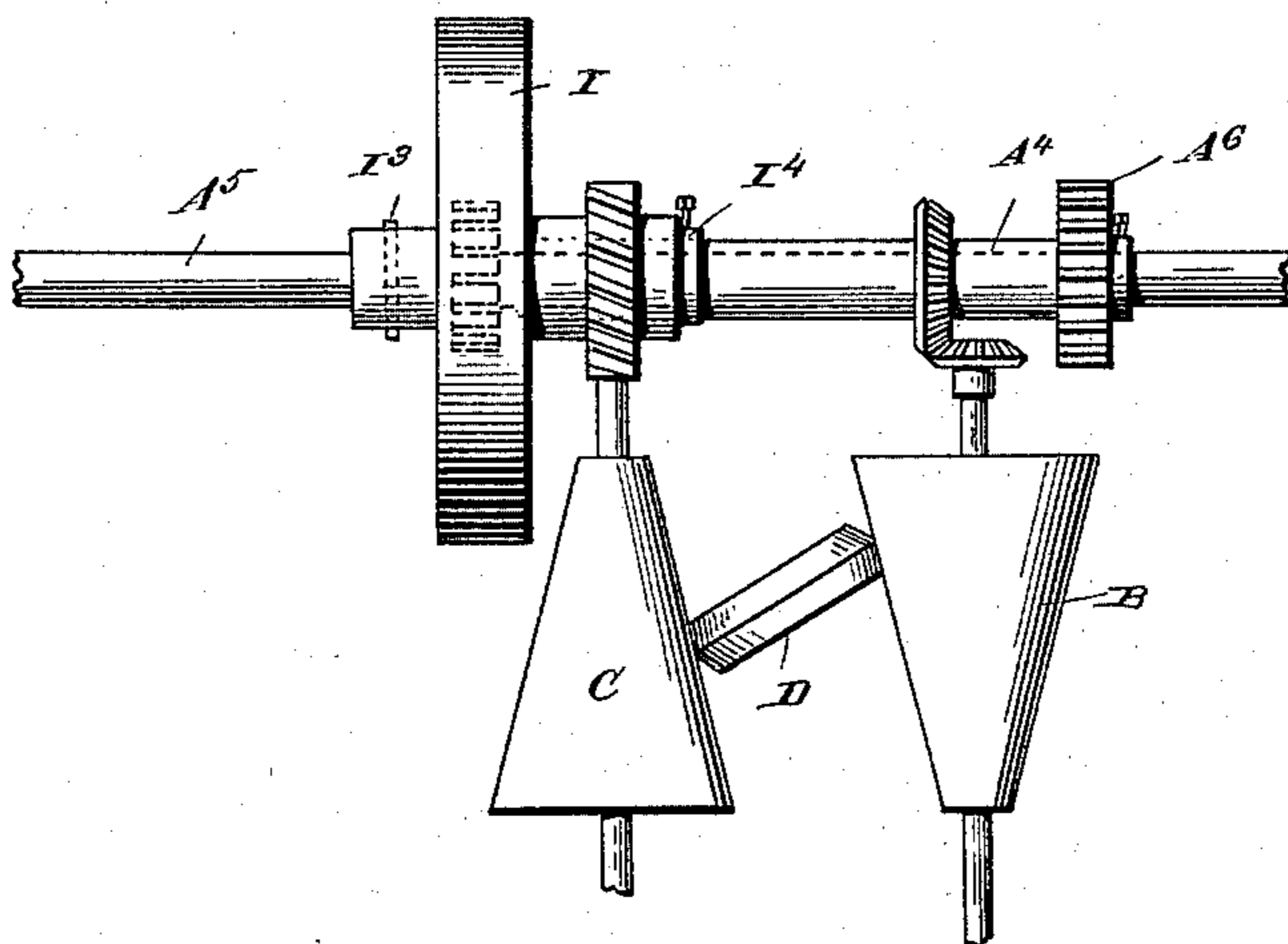
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Fig. 9.



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UNITED STATES PATENT OFFICE.

HENRY BEHRENS, OF HUNTINGBURG, INDIANA.

VARIABLE-SPEED GEAR.

SPECIFICATION forming part of Letters Patent No. 598,762, dated February 8, 1898.

Application filed January 12, 1897. Serial No. 618,997. (No model.)

To all whom it may concern:

Be it known that I, HENRY BEHRENS, residing at Huntingburg, in the county of Dubois and State of Indiana, have invented a new and useful Variable-Speed Gear, of which the following is a specification.

This invention is a new and useful construction of variable-speed gear, the object of the invention being to provide an exceedingly cheap, simple, durable, and efficient mechanical construction whereby the transmission of power from the power-shaft to the driven shaft can be regulated as desired, so that the said driven shaft can be moved at any speed desired.

With this object in view my invention consists in the peculiar construction of the various parts and in their novel combination or arrangement, all of which will be fully described hereinafter and pointed out in the claim.

In the drawings forming a part of this specification, Figure 1 is a perspective view of a speed-gear constructed in accordance with my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a view showing the mechanism of the transmitting-gear. Fig. 4 is a partial side elevation showing the manner of applying my invention to a bicycle. Fig. 5 is a detail perspective view of the crank-arm attached to the drive-shaft of the bicycle. Fig. 6 is a perspective view of the section of gear carrying the worm-gear upon the exterior. Fig. 7 is a transverse vertical section of the bicycle-driving mechanism. Fig. 8 is a detail view showing the manner of shifting the pulley. Fig. 9 is a detail top plan view showing the manner of applying the invention to an electric car.

In the practical application of my invention I propose to use it upon horseless carriages, bicycles, electric cars, hoisting-machines, and similar devices, and, in fact, the invention can be used in connection with any sort of machinery wherever it is desired or necessary to regulate the speed between the power and driven shafts.

The essential features of my invention are the same throughout all the modifications, inasmuch as it comprehends a power-shaft A, operated from any suitable source, which

drives a cone-pulley B by means of suitable gearing, which cone-pulley drives a reversely-arranged cone-pulley C through the medium of an adjustable friction pulley or wheel D, the second cone-pulley carrying a worm-shaft E, which meshes with a worm-gear F, formed integral with a disk G, said disk having a pinion H journaled upon the inner face and meshing with an internal gear I, and also with a pinion K, mounted upon the power-shaft A, the gear I being connected with the shaft to be driven in any suitable manner. The features just referred to are to be found in all of the various forms of my invention, and, referring now especially to Figs. 1, 2, and 3, I will particularly describe the construction which I prefer to use in connection with the horseless carriage, the device being illustrated and arranged upon the chamber of a gasoline-engine.

Power is transmitted to the shaft A in any suitable manner, and mounted upon the shaft is a beveled gear A', which meshes with a similar beveled gear A² and thereby drives the cone-pulley B, said pulley being mounted upon a shaft B', which is journaled upon one end in a bracket B² and at the opposite end in a hanger B³, the journal-box B⁴ being movable within the hanger, and connected to the said box is a coil-spring B⁵, the tendency of which is to move the said box inwardly and downwardly along the hanger. The friction pulley or wheel D is journaled in a suitable bracket D', which travels upon a screw D², operated in any suitable manner to move the said pulley or wheel back or forth, as desired. A cone-pulley C is arranged upon a shaft C', journaled between the brackets C² and C³, and upon the end of this shaft C' is mounted the worm E, which meshes with the worm-gear F before referred to, and it will be noted that an oil-cup E' is arranged beneath the worm E, and into which the said worm dips, so that it and the gear can be kept constantly lubricated. The worm-gear F is formed integral with a disk G, which is mounted loosely upon the power-shaft A and carries a pinion H upon the inner side, said pinion meshing with the internal teeth of the gear I, which is also loosely mounted upon the power-shaft A and carries a sprocket integral therewith

upon the outer side. A pinion K is mounted upon the power-shaft A within the gear I, as most clearly shown in Fig. 3.

Now in operation it will be distinctly understood that power is transmitted directly through the inclosed gear only and not through the cone-pulleys. The cone-pulleys, in connection with the adjustable friction-pulley, vary the speed at which the worm-gear will be operated, and consequently the internal gear.

In Figs. 4, 5, 6, and 7 I have shown the manner of applying my invention to a bicycle, and, referring to these figures, A indicates the power-shaft, which has a crank-arm M rigid therewith, and mounted upon the said arm are the pinions M' and M², which mesh with each other and also with the pinion K' at the center and the internal gear I², the periphery of the internal gear I² contacting with the tire of the rear wheel, as most clearly shown. The cone-pulleys B and C and friction-pulley D are arranged in substantially the same manner as shown in Figs. 1 and 2; but instead of the screw-rod D², I employ a rod D⁴, which is operated by a hand-lever D⁵, so that the pulley can be quickly adjusted between the cone-pulleys. The disk G' is recessed or dished, as shown at G², to permit the revolution of the crank-arm M, as most clearly shown in Figs. 6 and 7. It will of course be understood that all of the gears, shafts, and pinions will be provided with ball-bearings for the purpose of reducing the friction.

In Fig. 9 I have shown the principles of my invention applied to an electric railway-car, and, referring especially to the said figure, it will be noted that the power-shaft A⁴, cone-pulleys B and C, and friction-pulley D are ar-

ranged in substantially the same manner, the axle of the car being indicated by the letter A⁵. The internal gear I is exactly the same as that shown in Figs. 1, 2, and 3, the central pinion being fastened to the power-shaft A⁴, which in the present instance is tubular and fitted upon the axle and provided with a gear A⁶, which meshes with the gears of the motor. The internal gear I is rigidly mounted upon the axle by means of the pin I³, and in order to maintain the disk and worm-gear in place I employ a collar I⁴.

It will thus be seen that I provide an exceedingly cheap and simple construction of variable-speed gear which can be quickly and easily adapted for all the various purposes, and one which will thoroughly and efficiently perform all of the objects for which it is intended.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a variable-speed gear, the combination with the drive-shaft, of the cone-pulley operated from the said drive-shaft, the reversely-arranged cone-pulley, and the friction-pulley arranged between the two cone-pulleys, the worm-shaft operated from the reversely-arranged cone-pulley, the disk and gear operated by said worm loosely mounted on said drive-shaft, a pinion carried by said disk and a driving-disk also loosely mounted on said drive-shaft, and having internal teeth which are engaged by the pinion, substantially as shown and described.

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Witnesses:

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