(No Model.) 3 Sheets—Sheet 1.

B. T. NEDLAND & C. FREDRICKSON.

BICYCLE CHANGE GEAR.

No. 589,266. Patented Aug. 31, 1897.

Fig. 1.

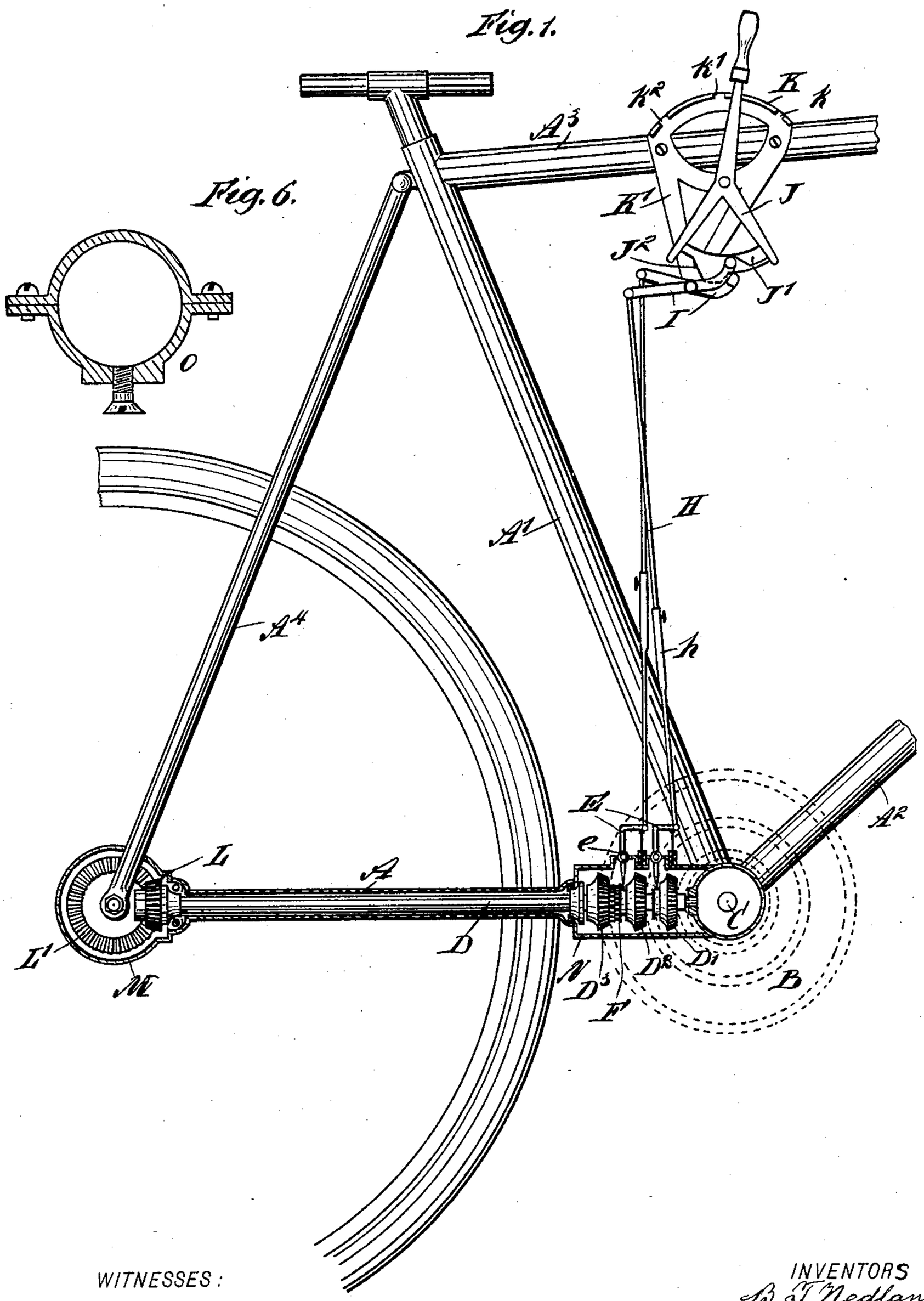


Fig. 6.

WITNESSES:

Otto Spieth

H. L. Reynolds.

INVENTORS

B. T. Nedland.

C. Fredrickson

BY

Munn & Co

ATTORNEYS.

(No Model.) 3 Sheets—Sheet 2.

B. T. NEDLAND & C. FREDRICKSON.

BICYCLE CHANGE GEAR.

No. 589,266. Patented Aug. 31, 1897.

Fig. 2.

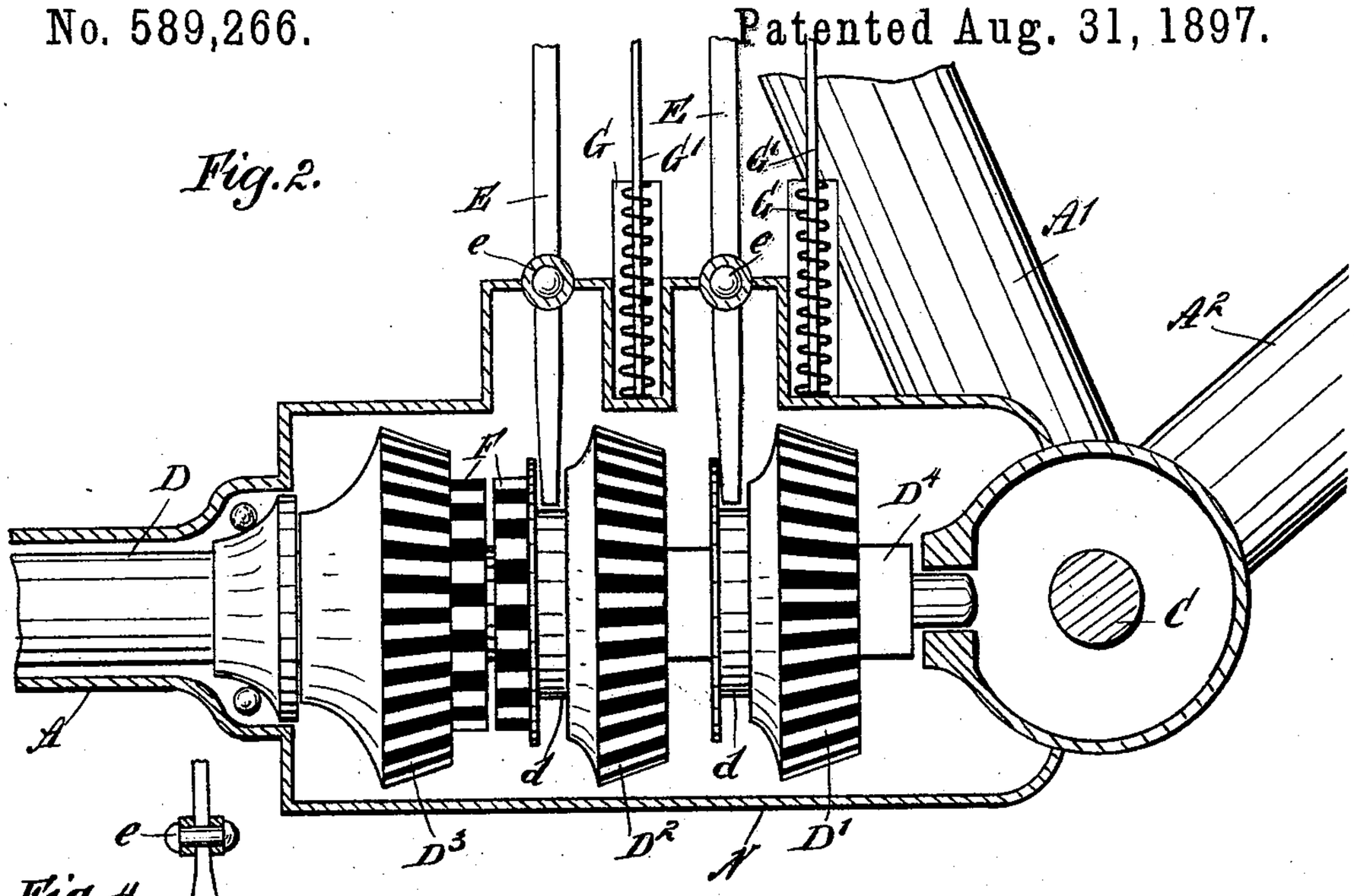


Fig. 4.

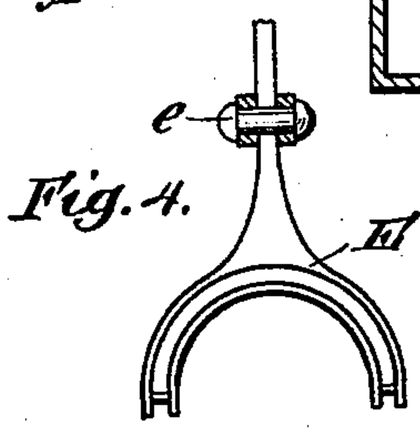
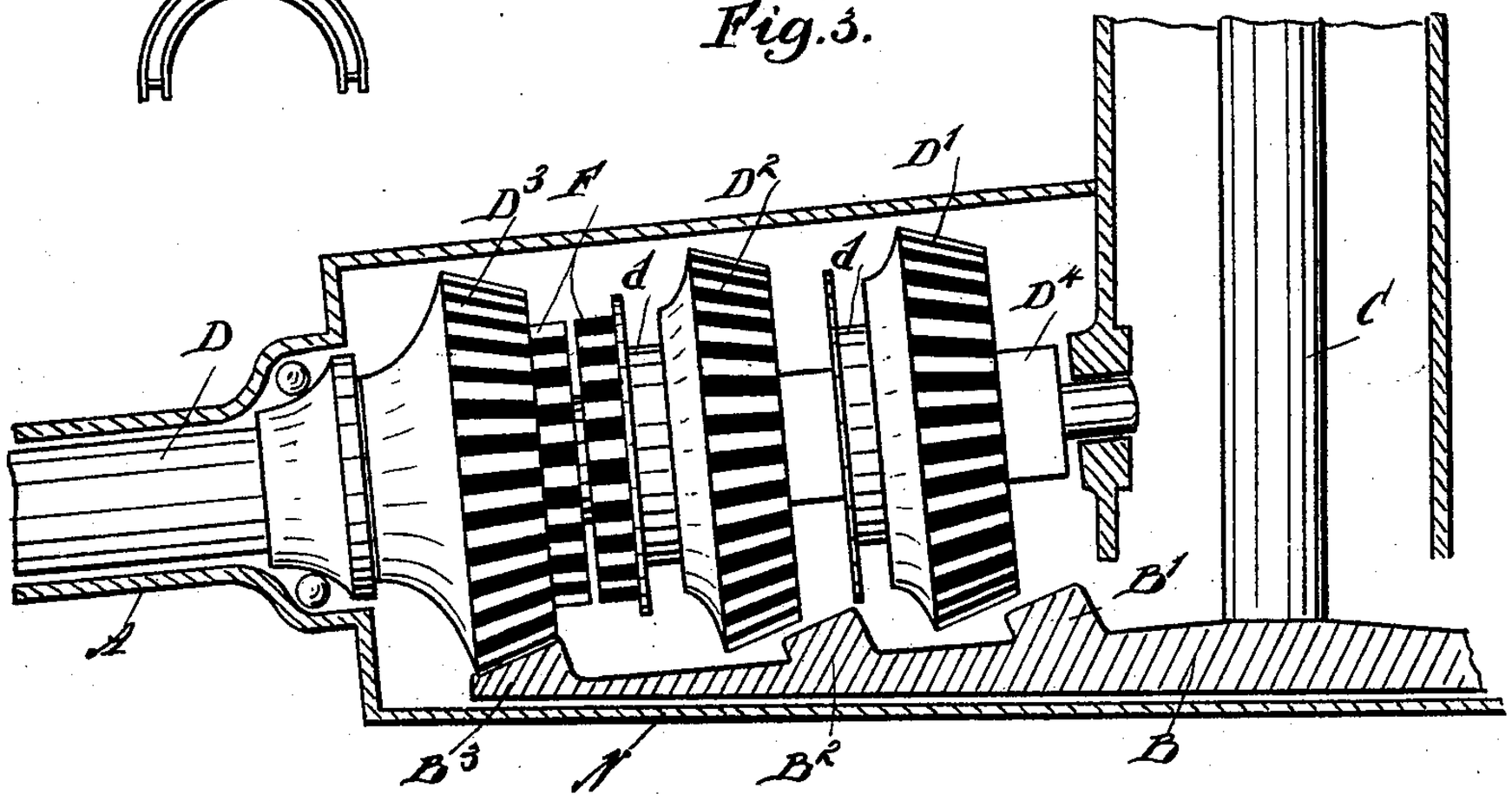


Fig. 3.



WITNESSES:

Otto Spieth

H. L. Reynolds.

INVENTORS

B. T. Nedland.

C. Fredrickson.

BY

ATTORNEYS.

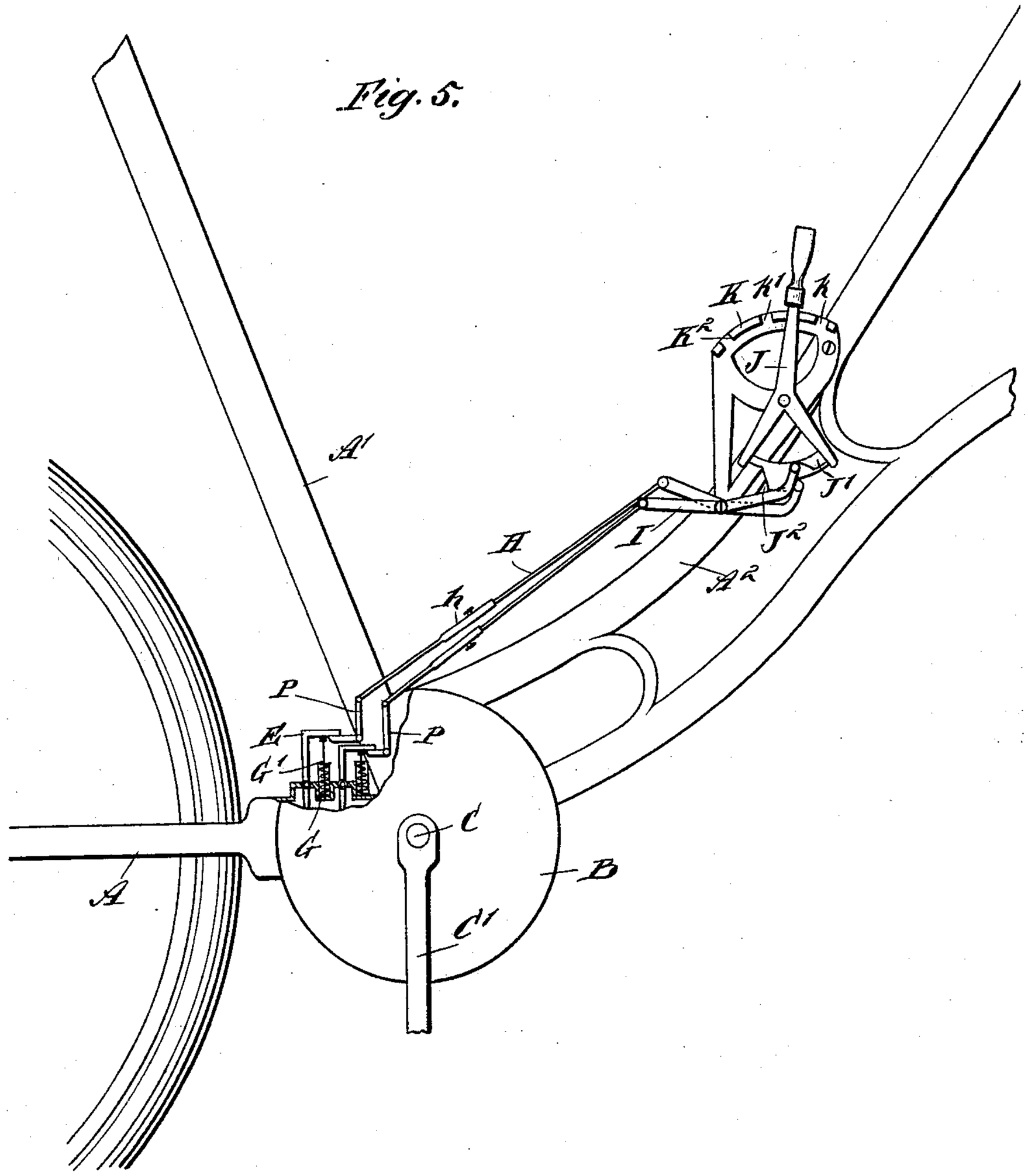
(No Model.) 3 Sheets—Sheet 3.

B. T. NEDLAND & C. FREDRICKSON.

BICYCLE CHANGE GEAR.

No. 589,266. Patented Aug. 31, 1897.

Fig. 5.



WITNESSES:

Otto Spieth

H. L. Reynolds

INVENTORS
B. T. Nedland
C. Fredrickson.

BY

ATTORNEYS.

UNITED STATES PATENT OFFICE.

BERNT T. NEDLAND AND CHRISTIAN FREDRICKSON, OF WESTBY, WISCONSIN.

BICYCLE CHANGE-GEAR.

SPECIFICATION forming part of Letters Patent No. 589,266, dated August 31, 1897.

Application filed April 9, 1897. Serial No. 631,341. (No model.)

To all whom it may concern:

Be it known that we, BERNT T. NEDLAND and CHRISTIAN FREDRICKSON, of Westby, in the county of Vernon and State of Wisconsin, have invented a new and Improved Bicycle Change-Gear, of which the following is a full, clear, and exact description.

Our invention relates to an improved change-gear for bicycles; and it consists of certain constructions which will be hereinafter described and particularly claimed.

Our invention also consists of certain details of construction, which will be more particularly pointed out and claimed in the specification and following claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of a portion of a bicycle, illustrating our invention, the case containing the gears and the shaft being shown in section. Fig. 2 is a longitudinal section through the case containing the front end of the shaft and the bevel-gears mounted thereon. Fig. 3 is a horizontal section through the same parts. Fig. 4 is an elevation of the shifting-lever which engages the pinions to shift them. Fig. 5 is a side elevation of a portion of a drop-frame bicycle, showing the manner in which the controlling-lever is mounted thereon; and Fig. 6 is a detail of the clamp by which the controlling-lever is mounted upon the frame of the machine.

Our device is applicable to any form of bicycle. The form to which we have shown it as applied is the usual safety-bicycle.

In the drawings, A represents one of the lower rear braces, extending from the crank-shaft to the axle of the rear wheel.

A′ is the seat-mast; A^2, the forward diagonal brace; A^3, the upper horizontal brace, and A^4 the upper rear brace.

Within the lower brace A is mounted a shaft D, which communicates the power from the crank-shaft to the rear wheel through the intervention of the bevel-gears L and L′, one mounted upon the shaft D and the other upon the axle of the rear wheel. These gears are inclosed in a case M, which is attached to and forms a part of the frame of the wheel. The shaft D is mounted at each end in ball-bearings. Upon the forward end of the shaft D are mounted three bevel-pinions. We have shown three pinions, although a greater or less number might be used if desired. The forward pair of these pinions D′ and D^2 are mounted upon a section D^4 of the shaft D, which is of a square or other cross-section, which will prevent the pinions from turning thereon, but will permit their sliding longitudinally thereon. The rear pinion D^3 is mounted so as to turn freely upon the shaft D.

The pinions D′ and D^2 are provided with a circumferential slot *d*, which receives the yoke or forked ends of shifting levers E. These levers are pivoted at *e* to the upper portion of the case N, which incloses the pinions. The levers E are bent at their upper ends and connected by means of rods G′ to spiral springs G, which are connected at their lower ends to the case N. The normal tendency of these springs is to throw the pinions D′ and D^2 toward the rear.

The levers E are connected by rods H with levers I, mounted upon the lower end of a plate K′, which is secured to the upper horizontal bar A^3 of the bicycle-frame. The forward ends of the levers I are provided with pins or rollers which engage the cam-flanges J′ and J^2, which are connected to one end of the controlling-lever J. The plate K′ is provided at its upper end with a flange K, which is shaped as a segment of a circle and provided with locking-notches *k*, *k′*, and k^2, adapted to receive the upper portion of the shifting lever J. This lever J is made of flat metal, so that it may be swung to one side sufficiently to release it from the notches, but will return therein as soon as released. The cam-flanges J′ and J^2 are so shaped that the pinions D′ and D^2 will be controlled so that only one at a time of the series will be engaged with the gear-wheel B on the crank-shaft C.

The pinion D′ is adapted to engage the teeth B′ upon the bevel gear-wheel B. The pinion D^2 is adapted to engage the teeth B^2 upon the said wheel, while the pinion D^3 is in constant engagement with the teeth B^3 upon said wheel. The pinions D^2 and D^3 upon their adjacent

sides are provided with clutches consisting of radial arms F, adapted to mesh with each other, so that the two pinions may be locked together. The pinion D^3 is locked to the shaft D by having the pinion D^2 shifted far enough to the rear to engage these clutches and lock the two pinions together. The pinion D^2 being mounted upon the non-circular section D^4 of the shaft D will be prevented from rotating thereon, and if it is locked to the pinion D^3 the gear B will rotate the shaft through the pinions D^3 and D^2.

In the position in which the parts are shown in Figs. 1, 2, and 3 the gears are all in inoperative position—that is, the crank-shaft is not connected so as to rotate the shaft D. If the controlling-lever J is thrown forward so as to engage the notch *k*, the lever I, which controls the position of the pinion D^2, will not be shifted. The other lever I, which controls the forward pinion D′, will have its forward end engaged by the cam portion J′ of the lever J, so as to throw that end downward and to throw the pinion D′ forward into engagement with the teeth B′ of the gear B. This is the adjustment which gives the greatest power and the slowest speed to the wheel.

If the controlling-lever J is shifted backward until it engages the notch *k*′, the lever controlling the forward pinion D′ will be thrown to the position shown in Fig. 1, in which the pinion D′ is disconnected from the gear-wheel, as shown in Figs. 2 and 3. The other lever I will, however, have its forward end depressed by the cam portion J^2 of the lever J until it rests on the extreme outer portion thereof. This will throw the pinion D^2 forward until it engages with the teeth B^2. This gives the medium adjustment of speed and power. If the controlling-lever be thrown farther to the rear until it engages the notch k^2, the lever I, controlling the forward pinion D′, will not be shifted, but the other lever will be shifted so as to allow the spring G to throw the pinion D^2 far enough to the rear to engage the clutch F upon its pinion and the pinion D^3, which will lock the pinion D^3 to the shaft D. This adjustment is the one for the greatest speed. The shifting device is thus controlled by a single lever, and it is impossible to have more than one of the pinions in engagement with the gear-wheel at the same time. By employing the springs G to throw the pinions in one direction it is possible to make the connection H of small wires or rods, which will weigh less than would be necessary did they act in compression instead of tension. The length of these wires H may be adjusted by means of the collar *h*, which is placed upon one end of the wire and which receives the opposite end. These two parts are secured to each other by means of a small set-screw which passes through the collar and engages the end of the other portion of the wire.

Our device is one which may be quickly changed from any one of the speeds to any other, and one which makes it impossible to have more than one set of gears in operation at a time. It is also possible to throw all of the pinions out of engagement, so that the crank-shaft is not concentric with the driving-wheel. The case N should entirely inclose both the gear-wheel B and the pinions upon the shaft D.

Fig. 5 shows the manner of attaching the controlling-lever to a drop-frame or ladies' wheel. The action of the parts is identical with that described for the other wheel, except that the levers P P are inserted to accommodate the device to the change of angle of the frame.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. A bicycle change-gear, comprising a beveled gear attached to the crank-axle and having concentric rings of beveled teeth, a shaft having beveled pinions and means for connecting and disconnecting said pinions, comprising a pivoted lever having segment-arms composed of concentric and eccentric surfaces, the latter being non-registering on different arcs, levers having one end engaging said cam-surfaces and connections therefrom to the pinions.

2. A bicycle change-gear, comprising a beveled gear attached to the crank-axle and having concentric rings of beveled teeth, a shaft having beveled pinions, a plate secured to the bicycle-frame in front of the saddle, having a notched locking-quadrant, a shifting lever pivoted concentric with said quadrant and having segments thereon composed of concentric and eccentric sections, the eccentric sections being differently located on each, levers pivoted to said plate, each engaging at one end the surface of one of said segments and connections from the said levers to the pinions to shift them.

BERNT T. NEDLAND.
CHRISTIAN FREDRICKSON.

Witnesses:
P. P. HEKTOEN,
MARTIN FREDRICKSON.