No. 719,770. PATENTED FEB. 3, 1903.

E. R. ESTEP.

VELOCIPEDE.

APPLICATION FILED OCT. 26, 1900.

NO MODEL. 3 SHEETS—SHEET 1.

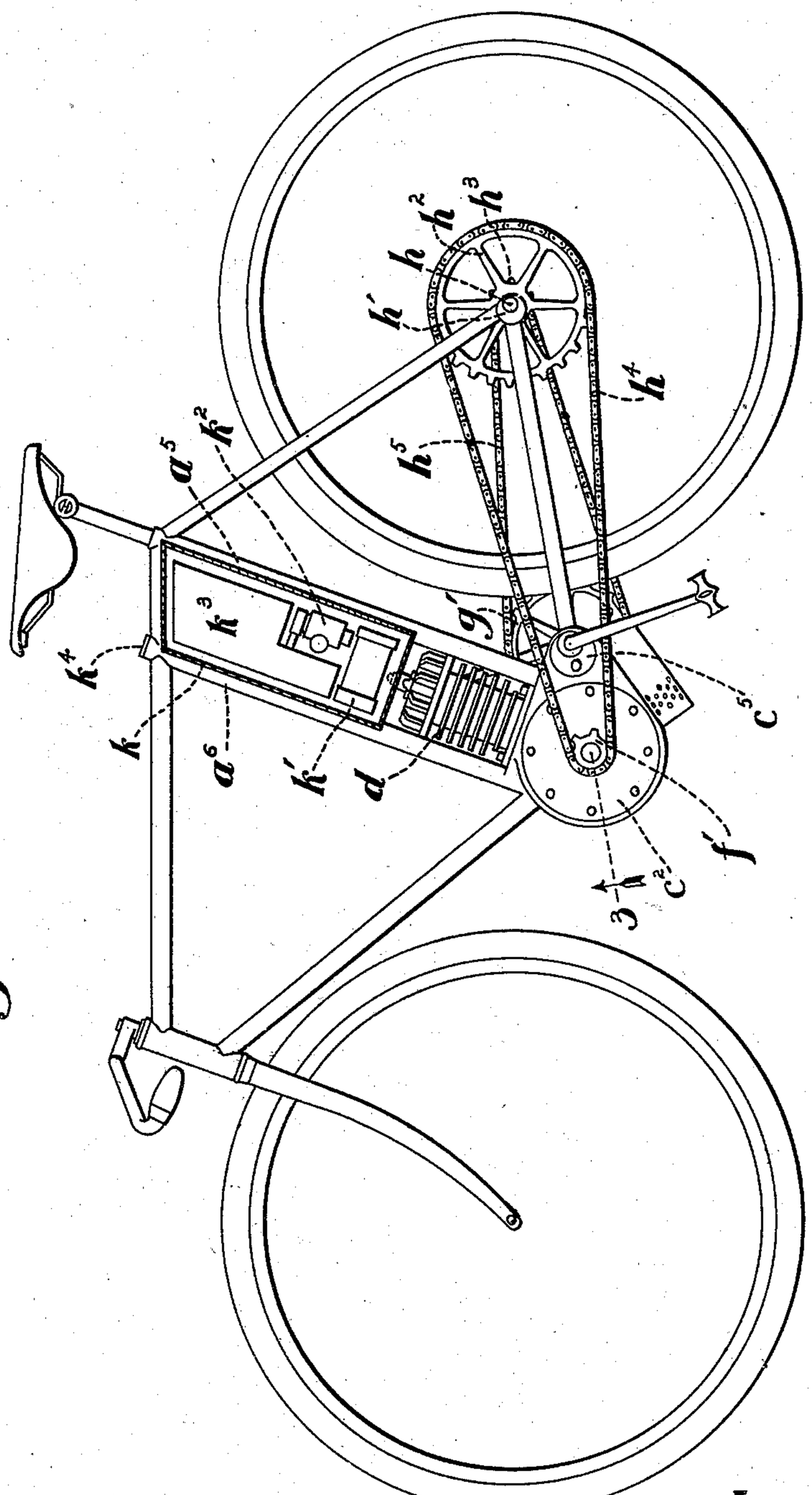

Fig. 1

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3 SHEETS—SHEET 2.

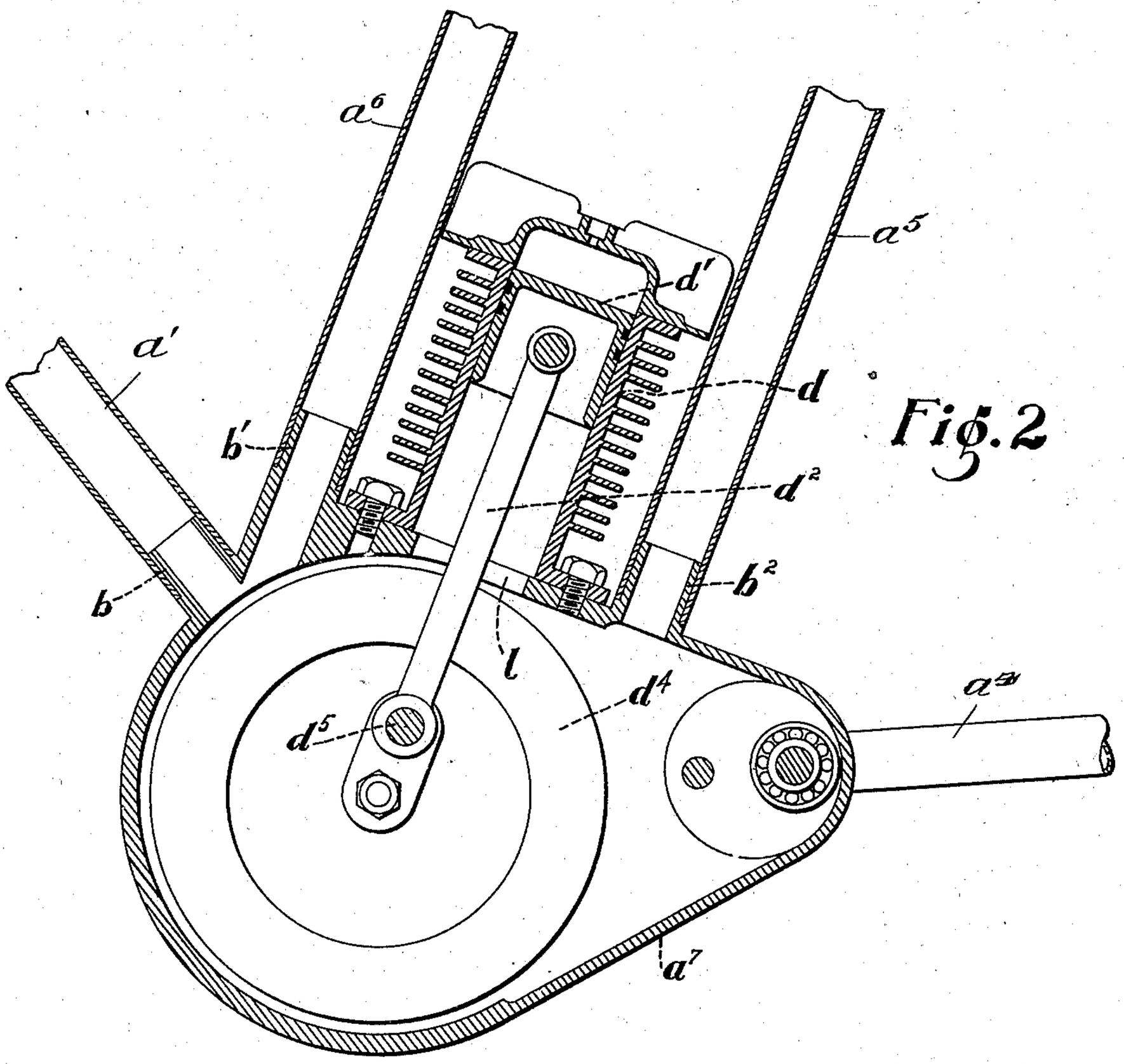

Fig. 2

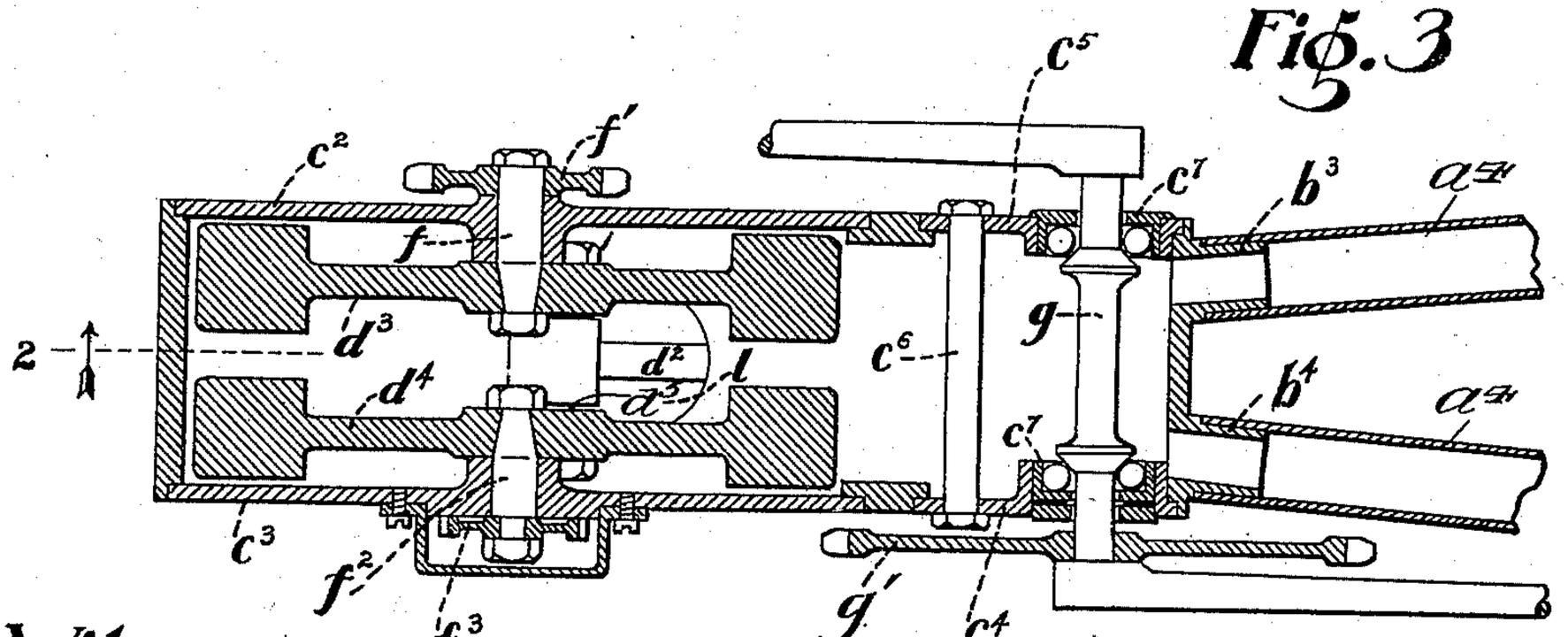

Fig. 3

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NO MODEL. 3 SHEETS—SHEET 3.

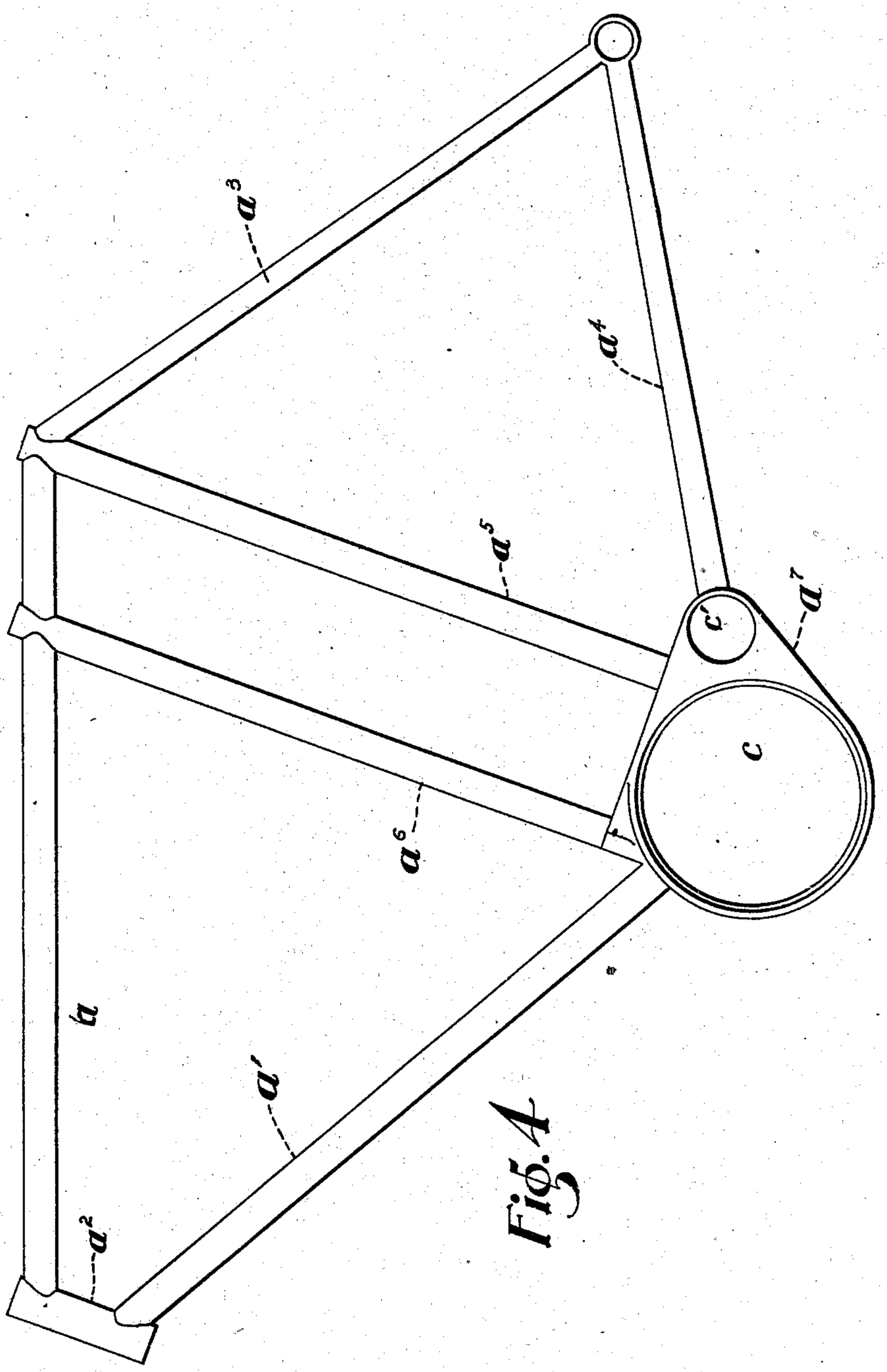

Fig. 4

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UNITED STATES PATENT OFFICE.

EDWIN RALPH ESTEP, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO S. A. MILES, OF CHICAGO, ILLINOIS.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 719,770, dated February 3, 1903.

Application filed October 26, 1900. Serial No. 34,463. (No model.)

To all whom it may concern:

Be it known that I, EDWIN RALPH ESTEP, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Velocipedes, of which the following is a specification.

My invention relates particularly to improvements in bicycles equipped with propelling means comprising both a motor and pedaling apparatus.

My primary object is to provide a frame of improved construction in which one of the frame members comprises a suitable box or casing wherein are journaled a rotary motor member and also the pedal-shaft.

Referring to the accompanying drawings, Figure 1 represents a bicycle having a frame constructed in accordance with my improvements; Fig. 2, an enlarged broken vertical longitudinal section taken as indicated at line 2 of Fig. 3; Fig. 3, an enlarged broken section taken as indicated at line 3 of Fig. 1, and Fig. 4 a view in side elevation of the frame.

In the preferred construction there are employed the usual top frame member a, the lower front frame member or reach a', steering-head a^2, upper rear forks a^3, lower rear forks a^4, two cross-braces a^5 and a^6, and a casing or box a^7, connected to the adjacent ends of the members a', a^4, a^5, and a^6. As shown in Figs. 2 and 3, the casing a^7 is provided with lugs b, b', b^2, b^3, and b^4 for connection with the adjacent members. In the construction shown the casing a^7 has flat sides and a rounded front and lower portion, from which the edge walls of the casing converge rearwardly and meet in a rounded apex. Preferably the casing comprises an integrally-formed portion supplied with lugs for attachment to the adjacent frame members and provided with circular lateral openings c and c'. The openings c are closed by plates c^2 c^3, secured in any suitable manner. The perforations c' receive plates c^4 c^5, connected by one or more bolts c^6 and supplied with eccentrically-placed pedal-shaft bearings c^7.

I have shown the bicycle equipped with a gasolene-engine, the cylinder of which is indicated by the letter d, the piston by d', the connecting-rod by d^2, and the fly-wheels by d^3 and d^4. The wheels d^3 and d^4 are connected by the crank d^5. The wheel d^3 is fixed to a rotary shaft f, journaled in the plate c^2 and having fixed to its outer end a sprocket-wheel f'. The wheel d^4 is fixed to a similar shaft f^2, journaled in the plate c^3 and carrying at its outer end a pinion f^3.

The pedal crank-shaft is represented by g and the sprocket-wheel thereon by g'. The rear-wheel shaft is represented by h and is shown journaled in an eccentric h' and equipped with a large sprocket-wheel h^2 and a small sprocket-wheel h^3. A sprocket-chain h^4 connects the sprocket-wheels f' and h^2, and a sprocket-chain h^5 connects the wheels g' and h^3.

I have shown the space above the cylinder d and between the frame members a^5 and a^6 occupied by a chamber or receptacle k, whose walls are suitably grooved or indented to receive the adjacent convex surfaces of the tubular frame members. The receptacle k may serve to receive suitable electric apparatus k' for producing a spark, a suitable carbureter k^2, and a gasolene-tank k^3, with which said carbureter is in communication.

The engine-valves may be operated from the pinion f^3 through any suitable medium.

The tubular frame member a^6 is shown provided with a removable cap k^4 and may serve as a receptacle for a battery.

As appears from Fig. 2, the cylinder d is bolted to the upper wall of the casing a^7, and there is a perforation l in the upper wall of the casing, through which the connecting-rod d^2 passes.

It will be observed that the relative sizes of the wheels f' and h^2 are such that the rear-wheel shaft is caused to rotate at a lower speed than the motor-shaft f, and the wheels g' and h^3 are of such relative sizes that the wheel g' rotates at a slower rate than does the wheel h^3. Thus the rider is enabled in pedaling to keep time readily with the motor. It will be observed that the distance between the motor-shaft f and the rear-wheel shaft h may be varied to change the tension of the chain h^4 by moving the eccentric h', and the distance between the rear-wheel shaft and the

pedal-shaft may be varied after adjustment of the chain h^4 to give a suitable tension to the chain h^5.

Modifications within the spirit of my invention may be made, the gist of my invention lying, generally stated, in the provision of a casing for a motor or motor member, which casing constitutes also a frame member which serves as a connecting medium between adjacent frame members. More specifically stated, the invention comprises a casing which constitutes both a frame member and a journal-box for a pedal-shaft and a rotary motor member, in combination with the adjacent frame members.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a vehicle of the character described, the combination of a frame having tubular members, a casing connecting the tubular members adjacent thereto and serving to receive a rotary motor member and a pedal-shaft, a rear-wheel shaft, an eccentric connected with the frame and receiving said rear-wheel shaft, an eccentric connected with said casing and receiving the pedal-shaft, a rotary motor member in said casing, sprocket-wheels for the rear wheel of the machine, sprocket-wheels connected with said rotary motor member and with said crank-shaft, respectively, and chains connecting one of the rear sprocket-wheels with the motor sprocket-wheel and the other rear sprocket-wheel with the pedal-shaft sprocket-wheel, substantially as and for the purpose set forth.

2. In a vehicle of the character described, a frame having tubular members, including a front reach, a rear reach, and two substantially parallel cross-braces, a casing serving to connect the frame members adjacent thereto, including said cross-braces, said casing comprising an integrally-formed lower frame member provided at its rear portion with a pedal-shaft bearing, and peripherally with lugs for attachment to the adjacent ends of adjacent frame members, and side plates removably secured to said lower frame member and provided with bearings for a rotary motor member, substantially as and for the purpose set forth.

EDWIN RALPH ESTEP.

In presence of—
D. W. LEE,
ALBERT D. BACCI.