

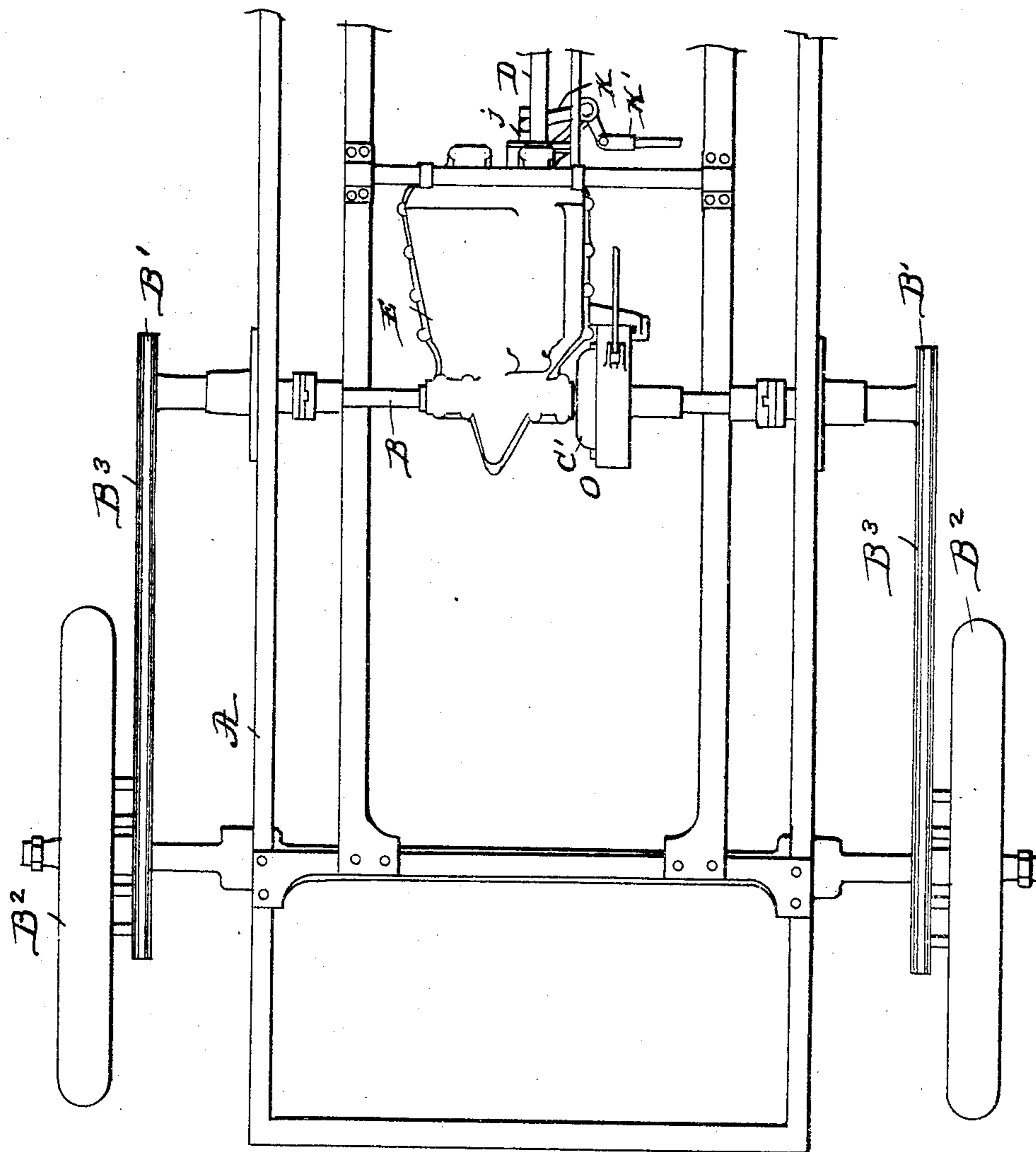
No. 782,898.

PATENTED FEB. 21, 1905.

L. S. CHADWICK.
AUTOMOBILE GEAR.

APPLICATION FILED AUG. 4, 1903.

4 SHEETS—SHEET 1.



WITNESSES:
Jesse B. Steller
M. M. Hamilton

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Lee S. Chadwick
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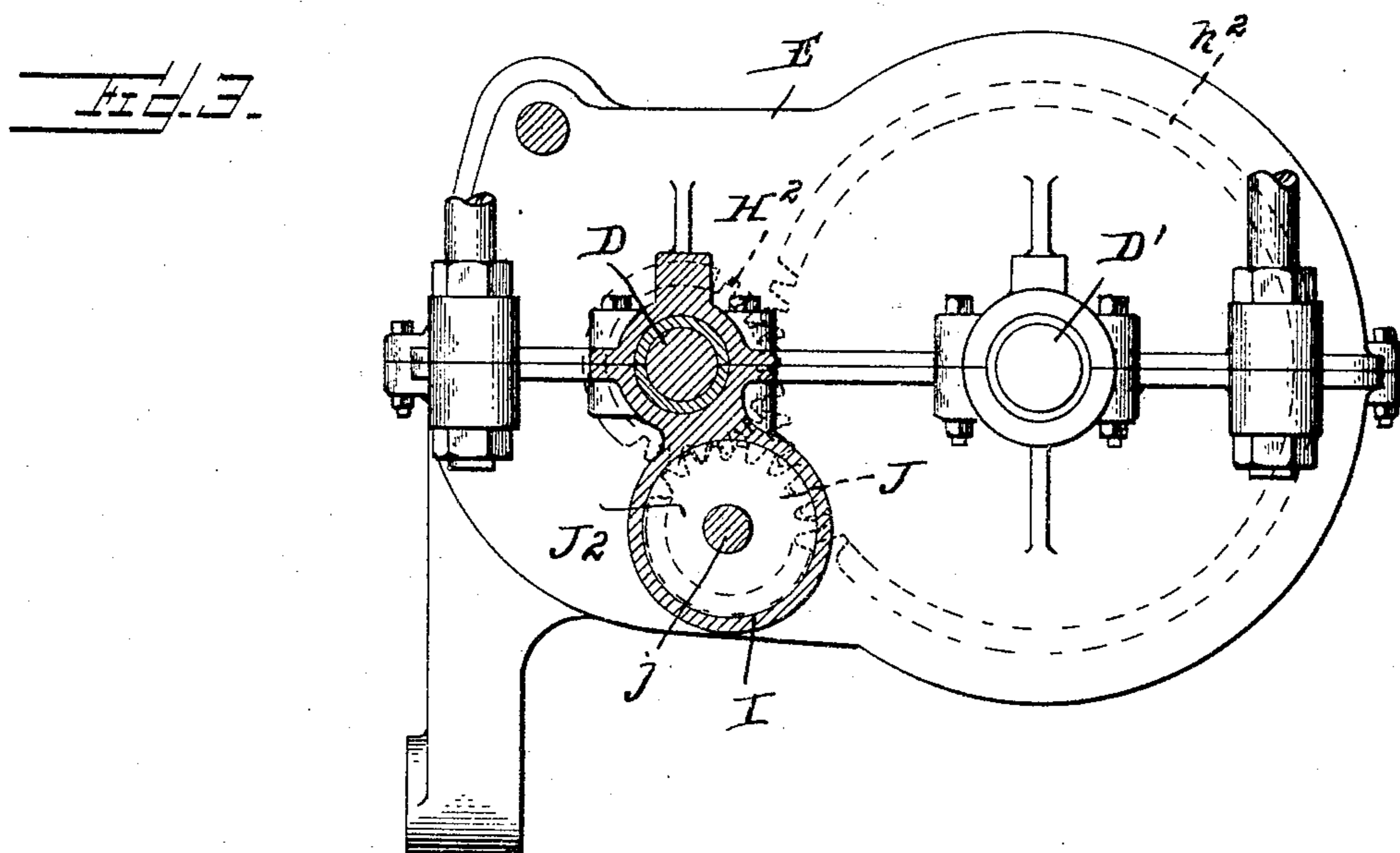
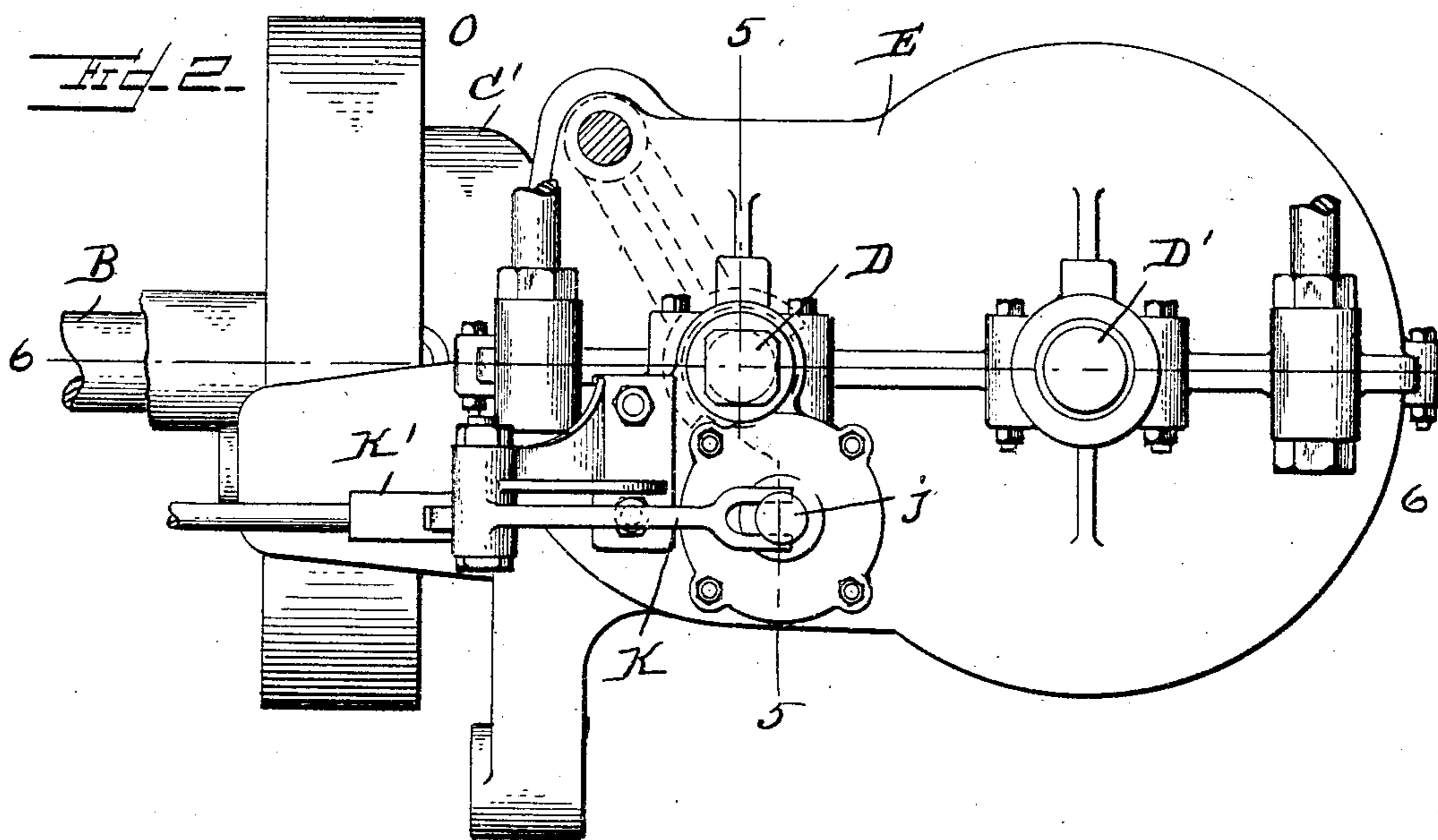
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4 SHEETS—SHEET 2.



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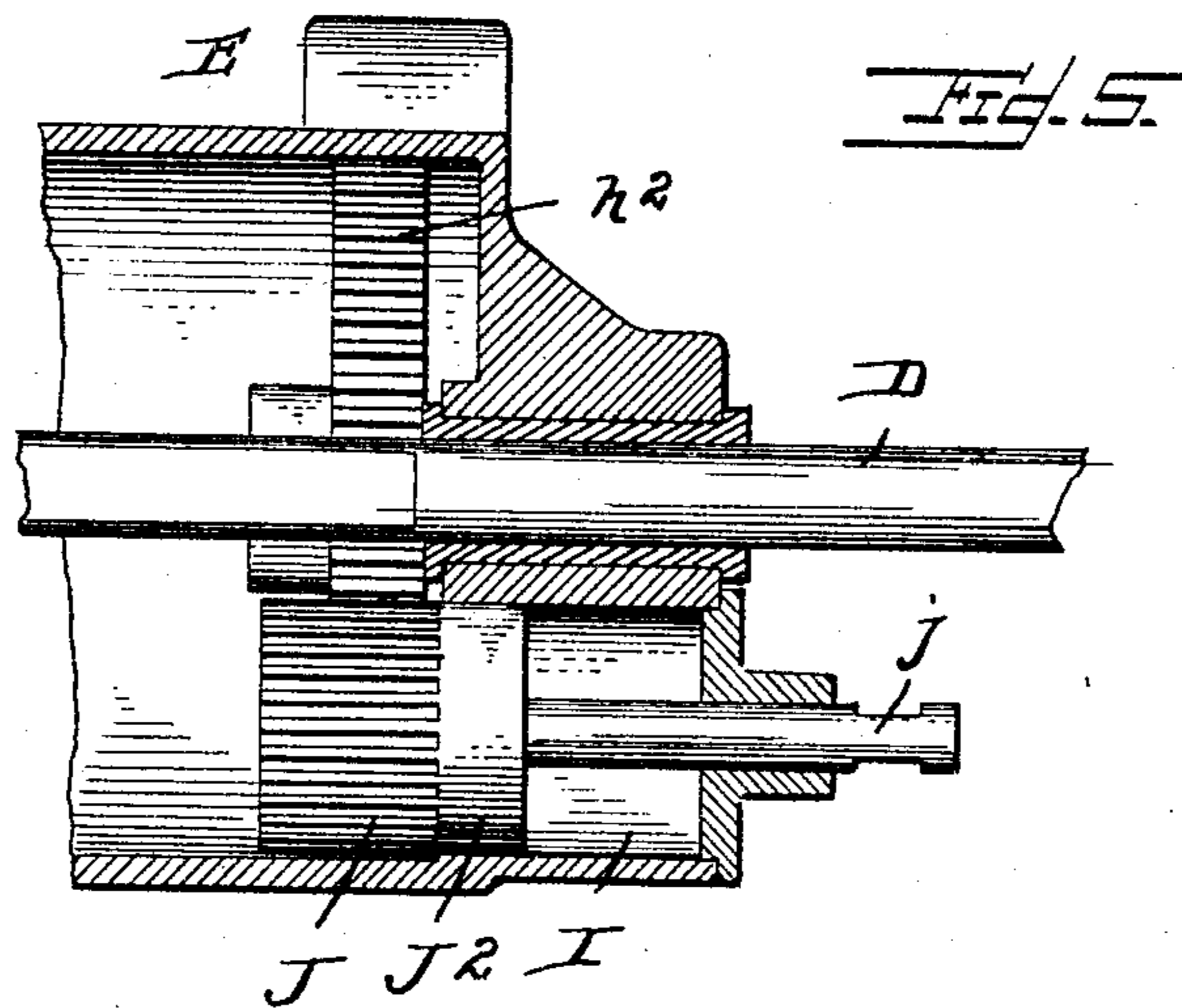
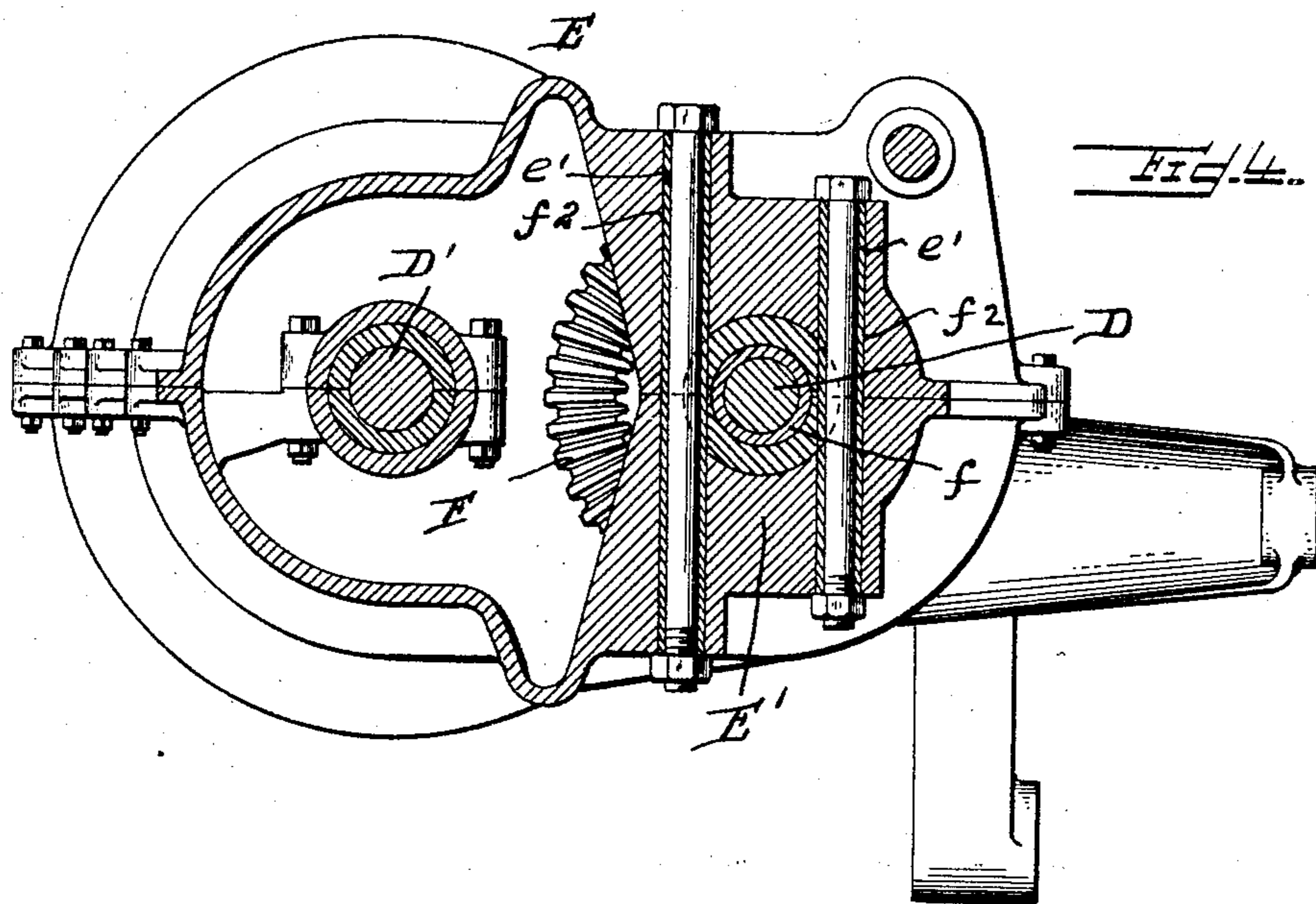
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4 SHEETS—SHEET 3.



WITNESSES:

Jesse B. Steller,
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UNITED STATES PATENT OFFICE.

LEE S. CHADWICK, OF RIDLEY PARK, PENNSYLVANIA.

AUTOMOBILE-GEAR.

SPECIFICATION forming part of Letters Patent No. 782,898, dated February 21, 1905.

Application filed August 4, 1903. Serial No. 168,138.

To all whom it may concern:

Be it known that I, LEES. CHADWICK, a citizen of the United States, residing at Ridley Park, county of Delaware, and State of Pennsylvania, have invented a new and useful Improvement in Automobile-Gears, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

I will first describe the embodiment of my invention illustrated in the accompanying drawings and then point out the invention in the claims.

In the drawings, Figure 1 is a plan view of a portion of the running-gear of an automobile with the transmission-case in position. Fig. 2 is an end view of the transmission-case. Fig. 3 is a section on the line 3 3 of Fig. 6. Fig. 4 is a section on the line 4 4 of Fig. 6. Fig. 5 is a section on the line 5 5 of Fig. 2. Fig. 6 is a section on the line 6 6 of Fig. 2.

A is the frame of the automobile.

B is the driving-shaft, having the sprocket-wheel B', driving the rear driving-wheel B² by the sprocket-chain B³. Upon the shaft B is the bevel-gear C, having the gear-faces *c c'* and the compensating gear C'. Between the compensating gear C' and the bevel-gear C is the operating-shaft D.

E is the gear-casing.

E' is a hollow bearing having the serrations *e*.

F is a bevel-gear having the hub *f*, provided with an annular opening. The hub *f* is provided with projecting rings *f'*. The bevel-gear F surrounds the bearing E', and the hub *f* enters the hollow bearing, the rings entering the serrations on the hub. The operating-shaft D has its seat in the hollow hub *f*.

*f*² is an orifice partially in the bearing E' and partially in the casing E, and a key *e'* holds the bevel-gear F from lateral movement in the bearing. The bevel F meshes with gear-face *c* of bevel C. Upon the shaft D, which is rectangular, is the rectangular sleeve G, having the gears H H' H² and the shifting collar H³.

The shaft D is operated by the vehicle-motor, and by means of a clutch (not shown)

is engaged and disengaged from driving connection with the motor. Upon the face of gear F are the clutch projections *f*³, and on the face of gear H are corresponding projections *n*³. By shifting the sleeve G so that the clutch projections *n*³ engage with clutch projections *f*³ the shaft D directly drives the bevel C.

D' is a second shaft. Upon this shaft D' is the bevel D², meshing with the gear-face *c'* of gear C. Upon this shaft D' are the gears *h h'* *h*², fixed to the shaft. The position of gears *h h'* *h*² and gears H, H', and H² are such that when the sleeve G is moved along the shaft D either gear H meshes with gear *h*, gear H' with *h'*, or gear H² with gear *h*², and the gear C and vehicle are driven at different speeds. There is a position on the shaft of sleeve G that gears H and H' have passed beyond gear *h* and *h'*, but before gear H² has reached gear *h*², gear H² and *h*² producing the slow speed. There is the neutral position at which the vehicle is at rest. In order to produce at this point a reversal of movement of the vehicle, I provide the following mechanism: Through the motor-casing is an orifice I.

J is a gear upon the shaft *j*, the outside diameter of gear J being the same size as the bore of the orifice I. The face of this gear J upon the shaft or spindle *j* is not cut the full width, thereby leaving the blank space J² of size substantially that of the bore of the orifice I. To the other end of shaft or spindle *j* is loosely connected one end of the bell crank lever K, operated by link K'. When the gears H, H', and H² are in the position last spoken of and the gear J moved through the orifice, the teeth of gear J will mesh with both gears H² and *h*², thereby reversing the train of gears, (see Fig. 6,) the length of gear J being sufficient to accomplish this.

The constructions described have many advantages. Among others, by using the hub of gear F as a bearing for the shaft D, I am enabled to make the casing smaller and the shaft shorter. By placing the compensating or differential gear beyond the shaft D and gear F the gears C and F may be made smaller and the casing narrower. By using a supplement-

tal casing O for the compensating gear I also provide a practical device for reversing the car at slow speed only.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is--

1. The combination with the driving-shaft of an automobile and a gear thereon, of a hollow bearing, a gear surrounding said bearing and meshing with the driving-shaft gear, said gear having a hollow hub entering the opening in said bearing and an operating-shaft having a seat or bearing in said hub.

2. The combination with the driving-shaft of an automobile and a gear thereon, of a hollow bearing, a gear surrounding said bearing and meshing with the driving-shaft gear, said gear having a hollow hub entering the opening in said bearing and an operating-shaft having a seat or bearing in said hub, and a clutch adapted to make engagement between the operating-shaft and the gear meshing with the driving-shaft gear.

3. In an automobile, in combination, an idler-gear, a bearing in which said idler-gear slidably fits, a shaft to which said gear is secured, a guiding-collar, making a slidable fit with said bearing, upon said shaft, an operating-lever and connection between said operating lever and shaft.

4. In an automobile, in combination, a gear-case, an idler-gear, there being an orifice in said casing in which said gear slidably fits, a shaft to which said gear is secured, a sliding collar, making a slidable fit with said orifice in said casing, upon said shaft, an operating-lever and connection between said operating lever and shaft.

In testimony of which invention I have hereunto set my hand on this 28th day of July, 1903.

LEE S. CHADWICK.

Witnesses:

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GEO. B. HARVEY.