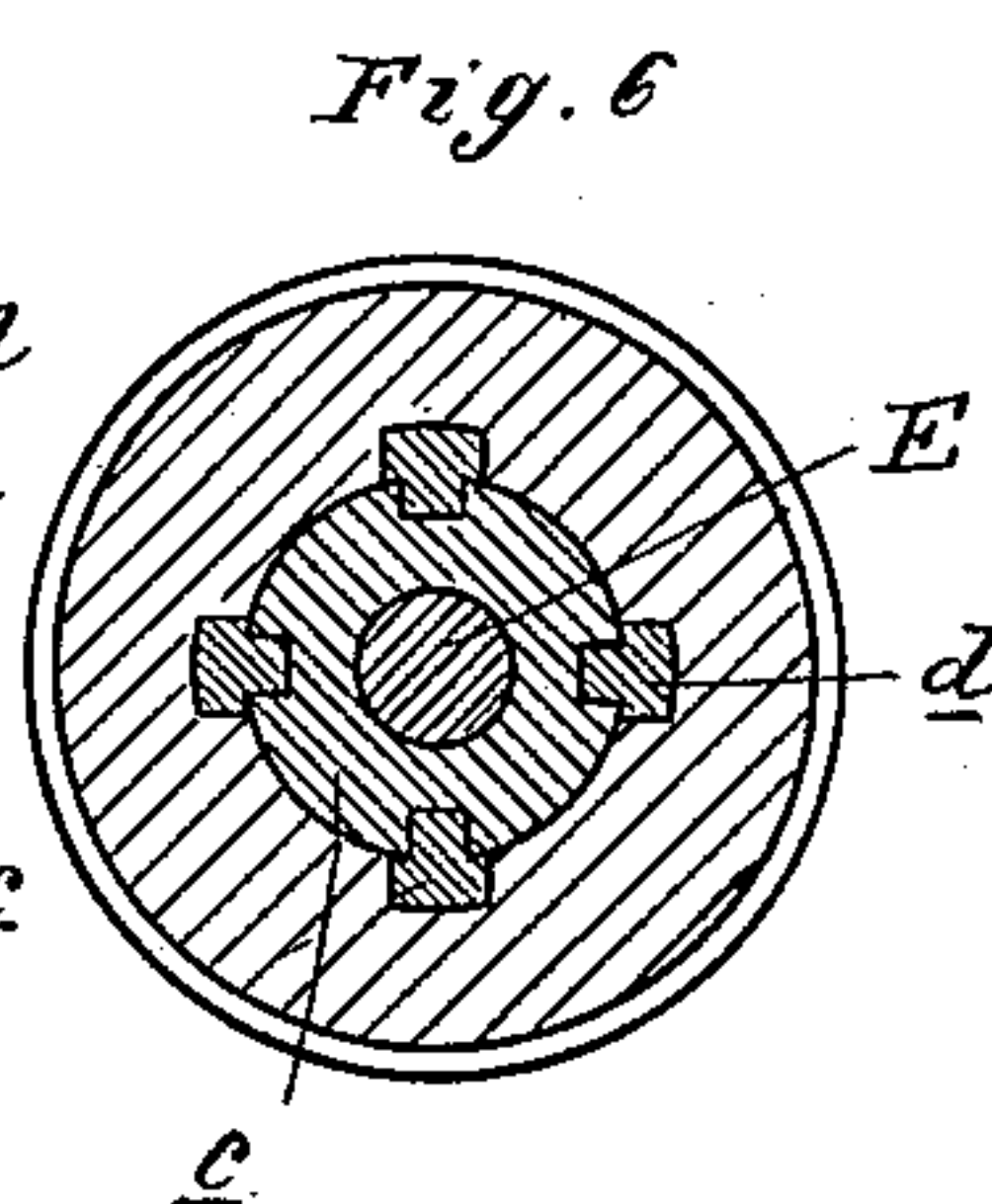
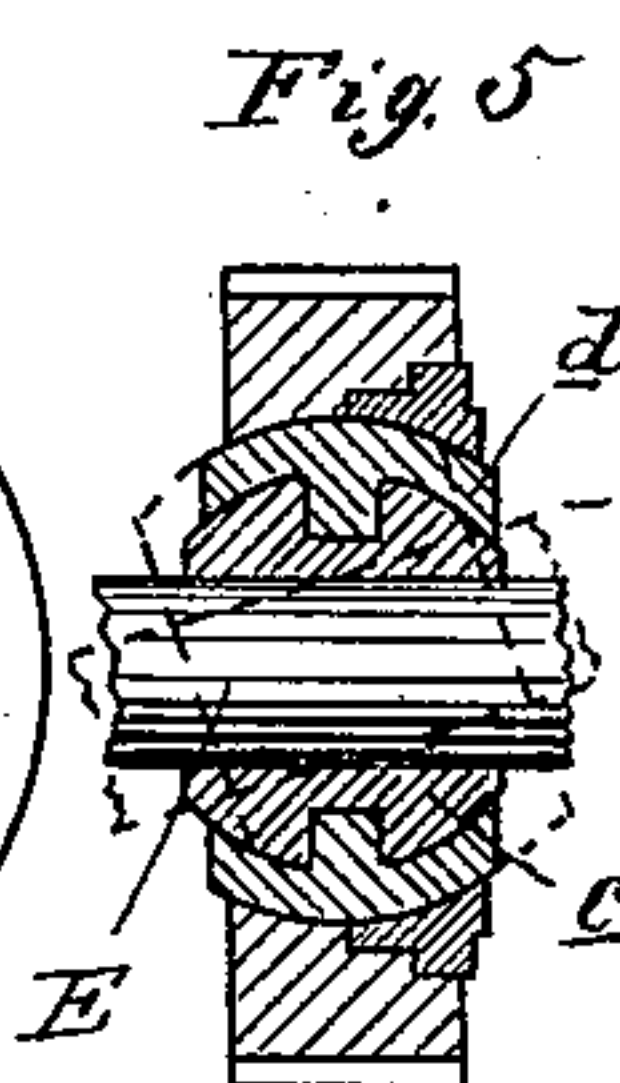
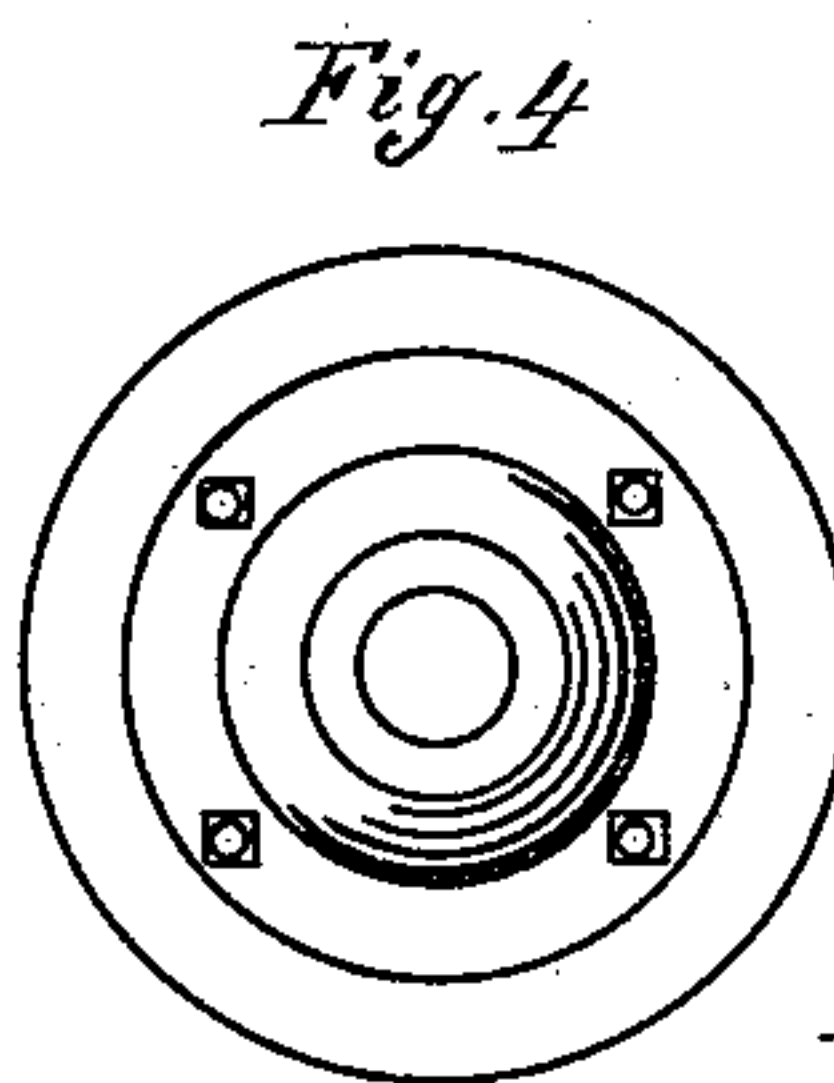
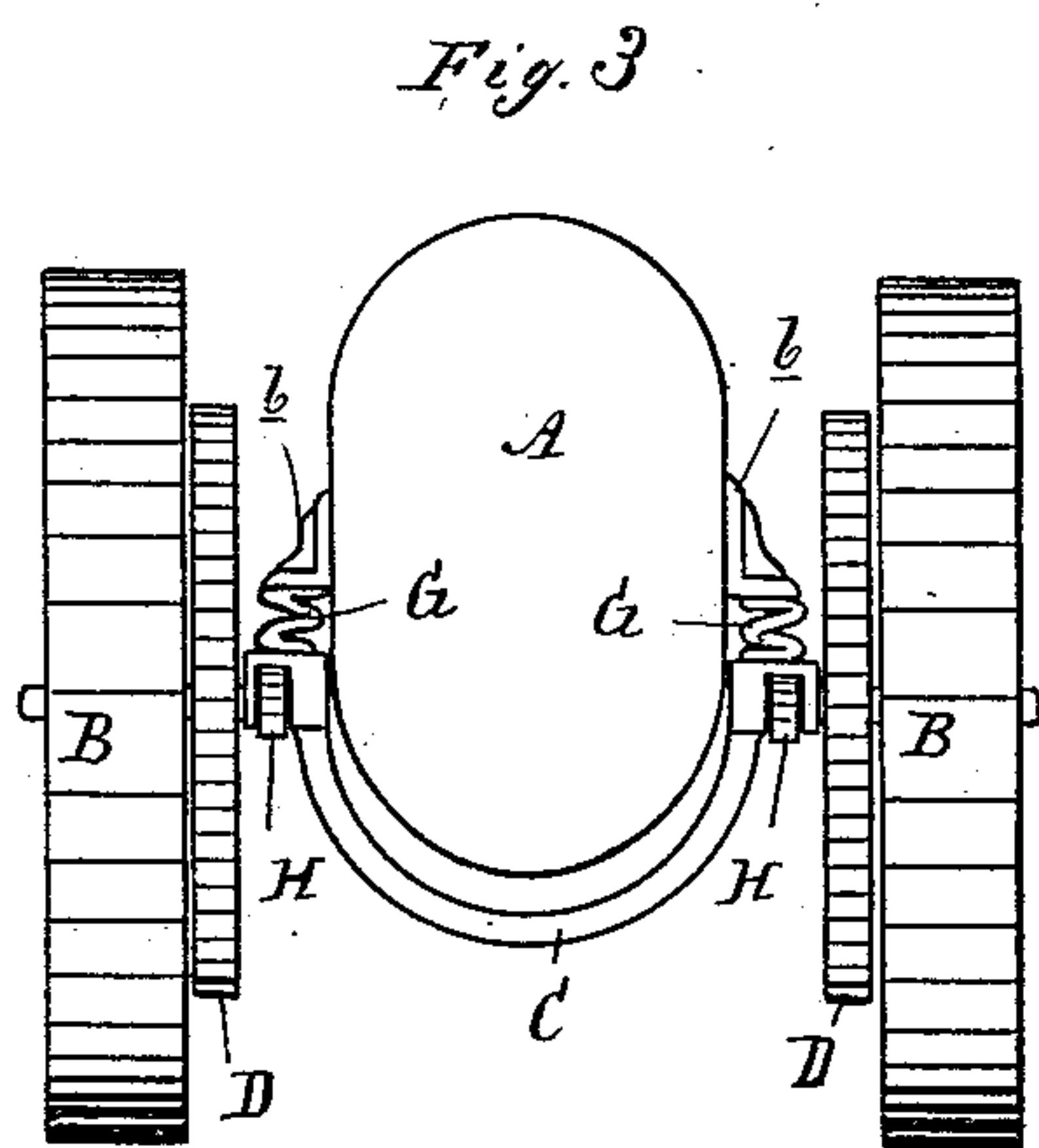
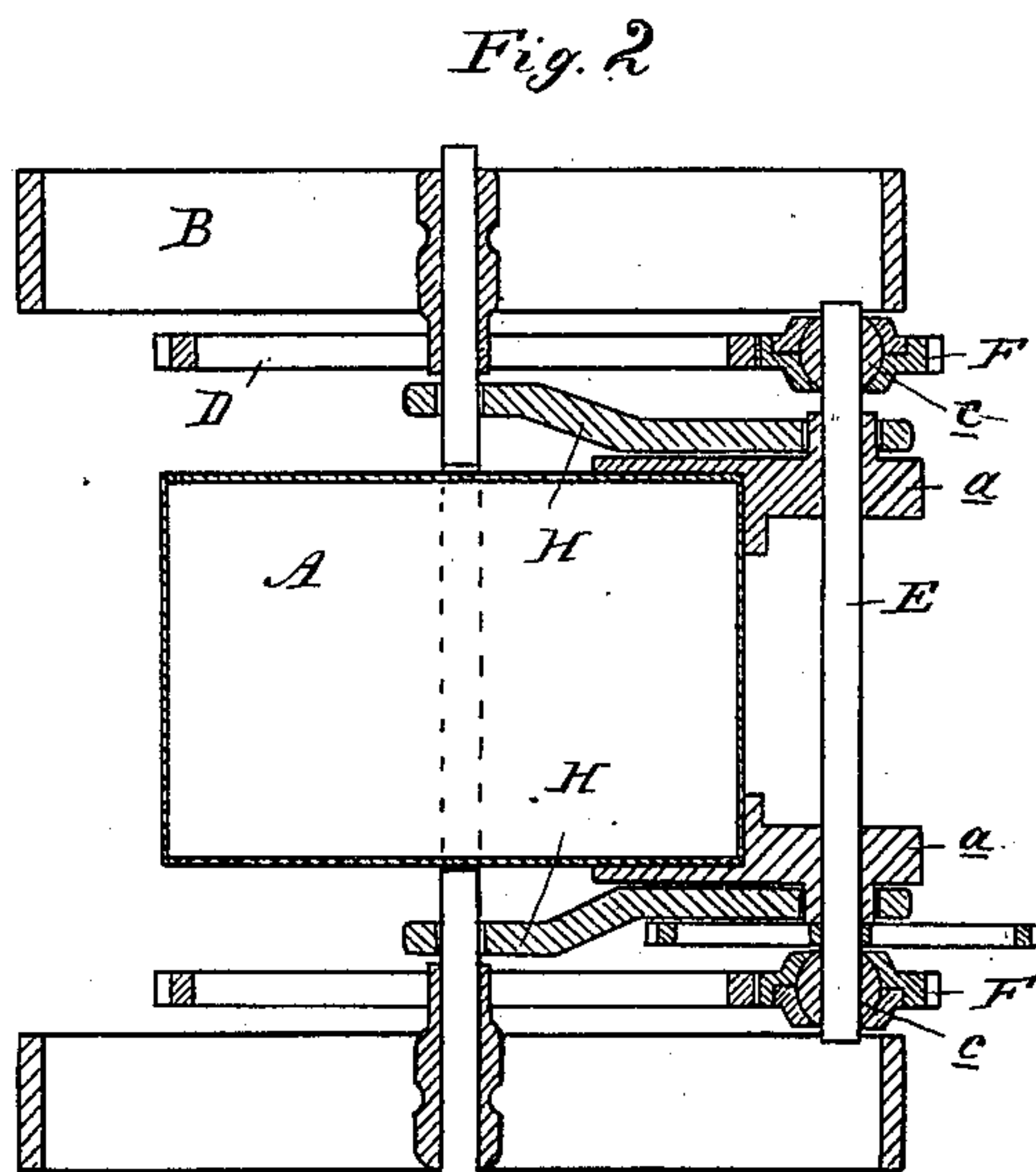
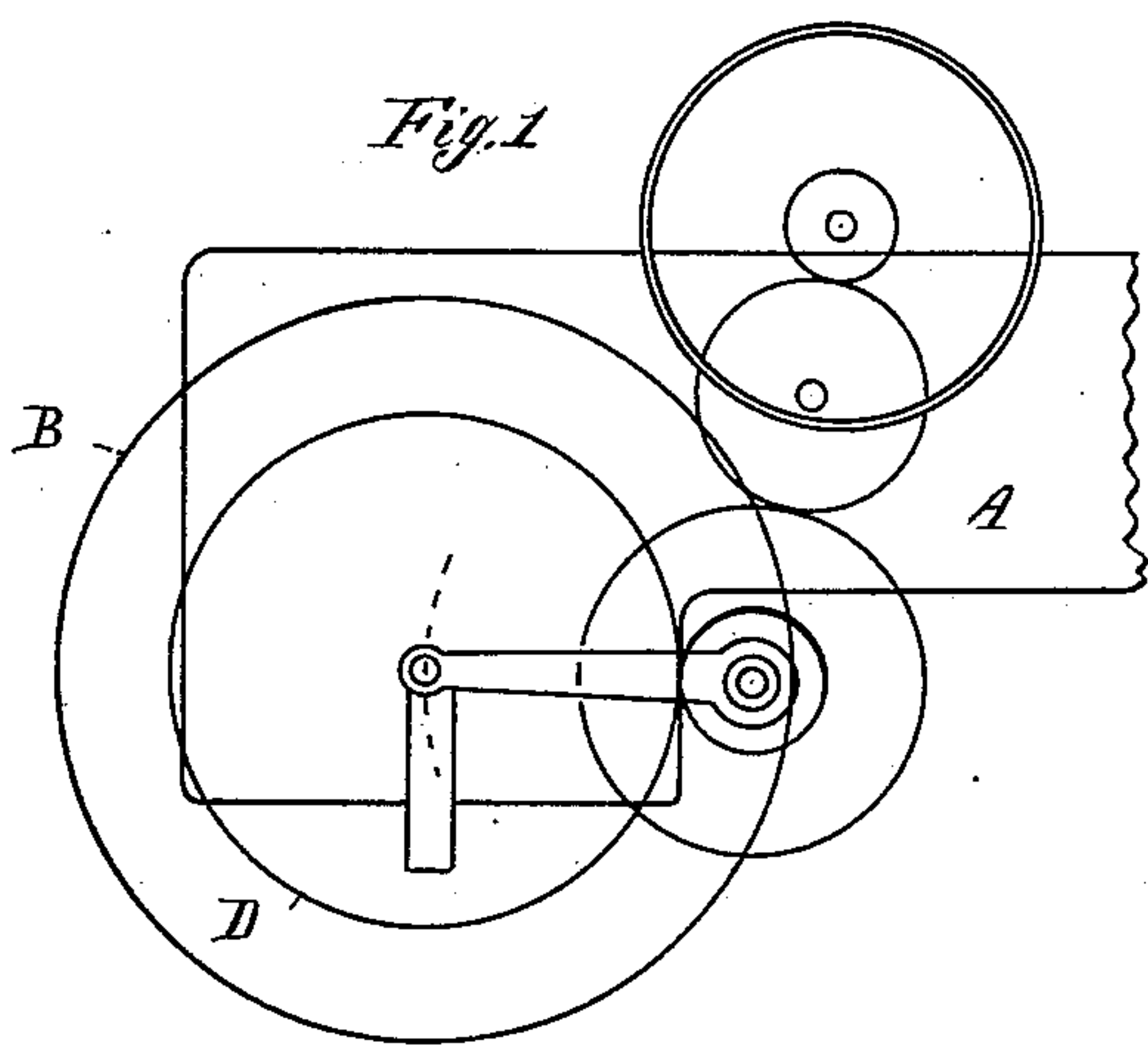


(No Model.)

B. J. ARNOLD.  
TRACTION ENGINE.

No. 335,497.

Patented Feb. 2, 1886.



Attest:  
John Schuman.  
A. S. Sprague.

Inventor:  
Bion J. Arnold.  
by his Atty  
A. S. Sprague

# UNITED STATES PATENT OFFICE.

BION J. ARNOLD, OF HILLSDALE, MICHIGAN.

## TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 335,497, dated February 2, 1886.

Application filed December 3, 1885. Serial No. 184,565. (No model.)

*To all whom it may concern:*

Be it known that I, BION J. ARNOLD, of Hillsdale, in the county of Hillsdale and State of Michigan, have invented new and useful  
5 Improvements in Traction-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

10 This invention relates to certain new and useful improvements in traction-engines; and the invention consists in the peculiar construction and arrangement of elastic bearings for traction-engines, all as more fully herein-  
15 after set forth.

In the drawings, which accompany this specification, Figure 1 is a side elevation of a traction-engine provided with my improvement. Fig. 2 is a plan thereof in section.  
20 Fig. 3 is a rear elevation; and Figs. 4, 5, and 6 are details of the drive-pinions, specifically referred to hereinafter.

A represents the boiler of a traction-engine; B B, the rear wheels; C, the rear axle; D D, the  
25 drive-gears; E, a counter-shaft journaled in bearings *a*, which are secured to the boiler, and F F are drive-pinions on the counter-shaft E and engaging with the driving-gears D D, all of the usual construction, except as here-  
30 inafter described.

G G are elastic bearings interposed between the rear axles and the boiler-supports *b*.

H H are links pivotally secured at their rear ends to the rear axle and at their front ends  
35 are pivotally connected to the bearings *a*.

Each drive-pinion F F is constructed as follows: Its central portion, *c*, forms a ball, which is secured upon the counter-shaft E. Upon  
40 this ball the pinion is seated with a ball-socket, which is provided with segmental grooves, into which the segmental projections *d* engage. These segmental projections may be integral

parts of the ball, but they are preferably provided with a round socket-pin, which turns  
freely in a corresponding socket in the ball. 45

In practice it will be seen that while the rear end of the boiler is now supported upon elastic bearings the proper relative position between the drive-gears D D and drive-pinions F F is always maintained. The links H H  
50 compel the drive-wheels D D to move concentrically to the pinions F F, and if one of the elastic bearings is more compressed than the other, then the ball-and-socket joint will compensate for the change of parallelism  
55 between the axis of the drive-gears and the axis of the pinions.

The spirit of my invention consists in connecting the rear axle by means of draw-bars with the counter-shaft, so as to compel it to  
60 move concentrically thereto; and it further consists in compensating any angular displacements between the counter-shaft and the rear axle by means of the drive-pinions provided with a ball-and-socket joint. 65

What I claim as my invention is—

1. In a traction-engine having the rear end of the boiler supported upon elastic bearings upon the rear axle, the draw-bars H H, pivotally connecting the rear axle with the counter-shaft of the drive-pinions and surrounding  
70 said axle and shaft, in combination with a ball-and-socket joint in the drive-pinions, substantially as described.

2. In a traction-engine, the combination of  
75 the springs G G, rear axle, C, draw-bars H H, counter-shaft E, pinions F F, provided with ball-and-socket joint, and the segmental projections *d*, arranged and combined substantially as described.

B. J. ARNOLD.

Witnesses:

H. S. SPRAGUE,  
CHARLES J. HUNT.