

(No Model.)

3 Sheets—Sheet 1.

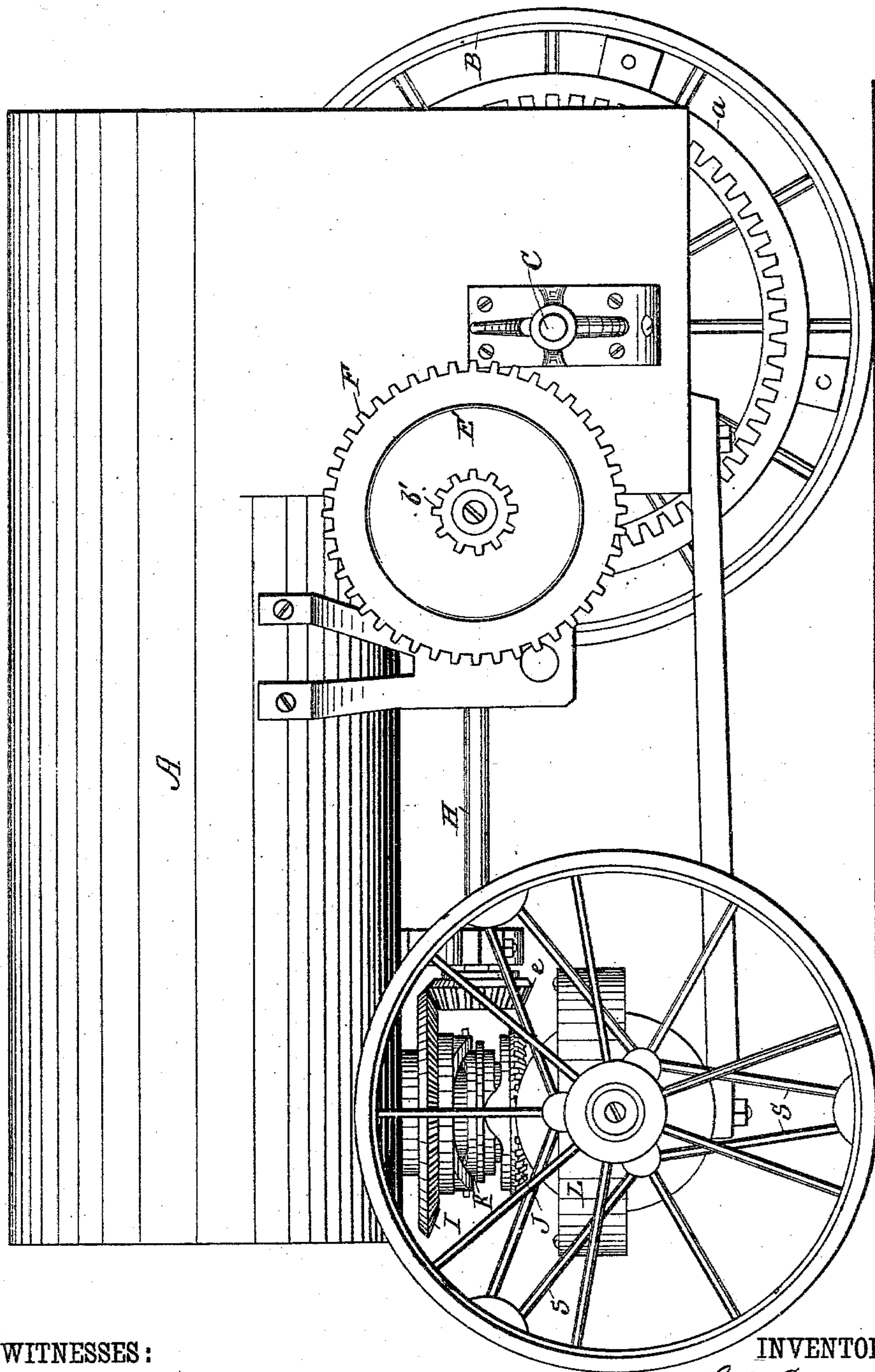
L. E. BANDELIER.

TRACTION ENGINE.

No. 280,999.

Patented July 10, 1883.

Fig. 1.



WITNESSES:

W. W. Hollingsworth  
Edw. W. Ryan

INVENTOR:

L. E. Bandelier  
BY *M. F. L.*  
ATTORNEYS.

(No Model.)

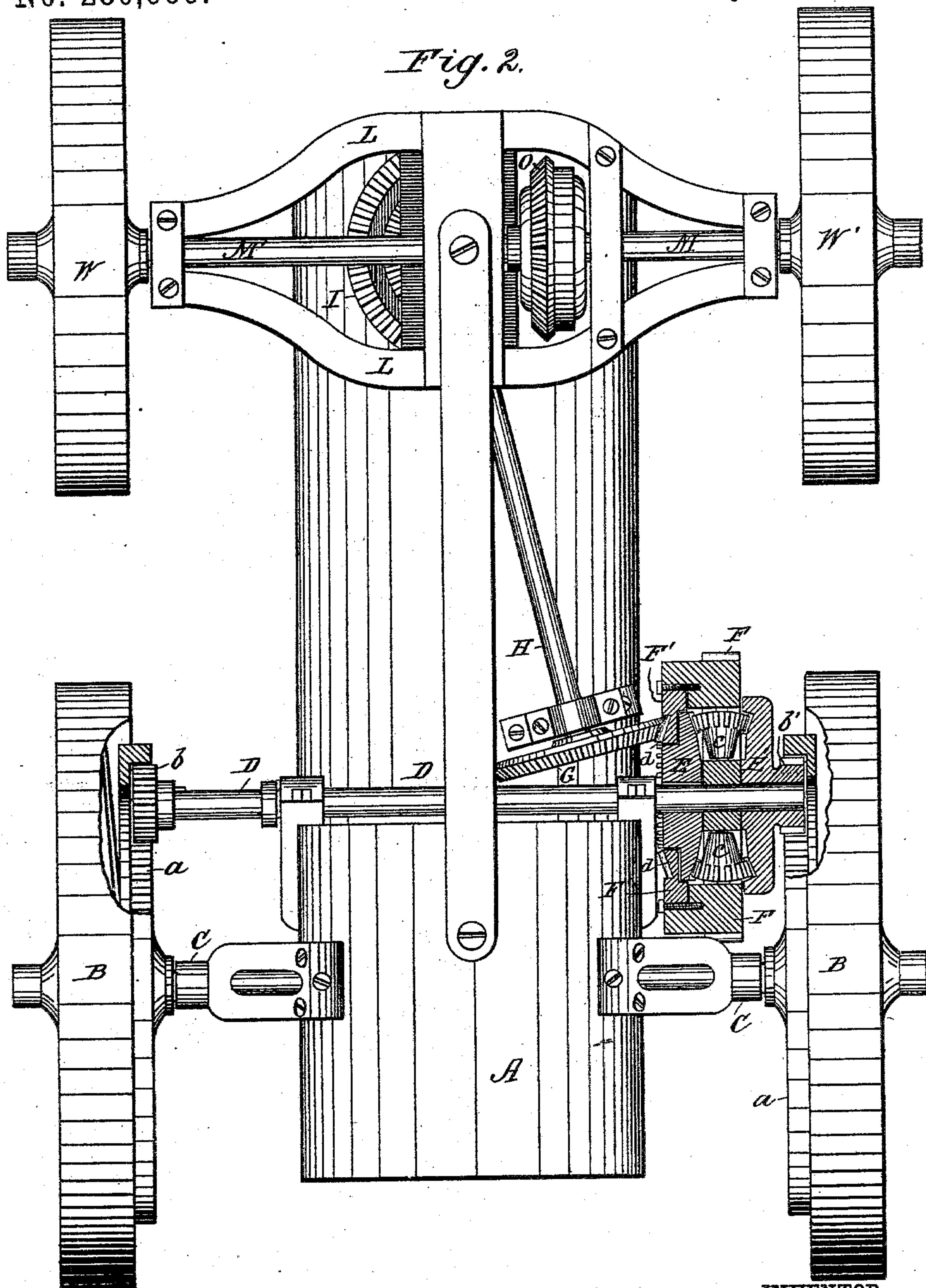
3 Sheets—Sheet 2

L. E. BANDELIER.

TRACTION ENGINE.

No. 280,999.

Patented July 10, 1883.



WITNESSES:

*W. W. Hollingsworth*  
*Edw. W. Byrnes*

INVENTOR:

*L. E. Bandelier*  
BY *Munn & Co*

ATTORNEYS.



(No Model.)

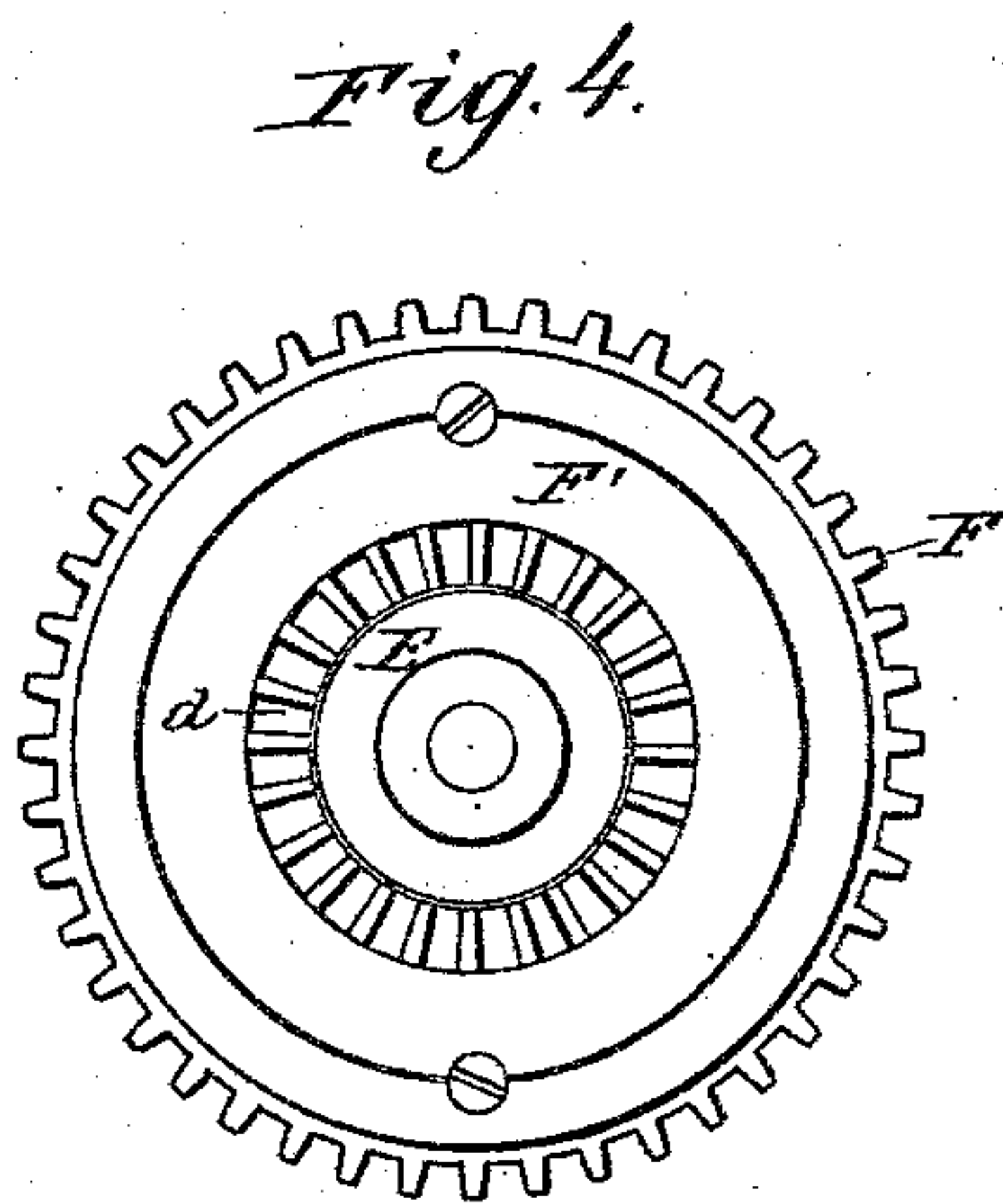
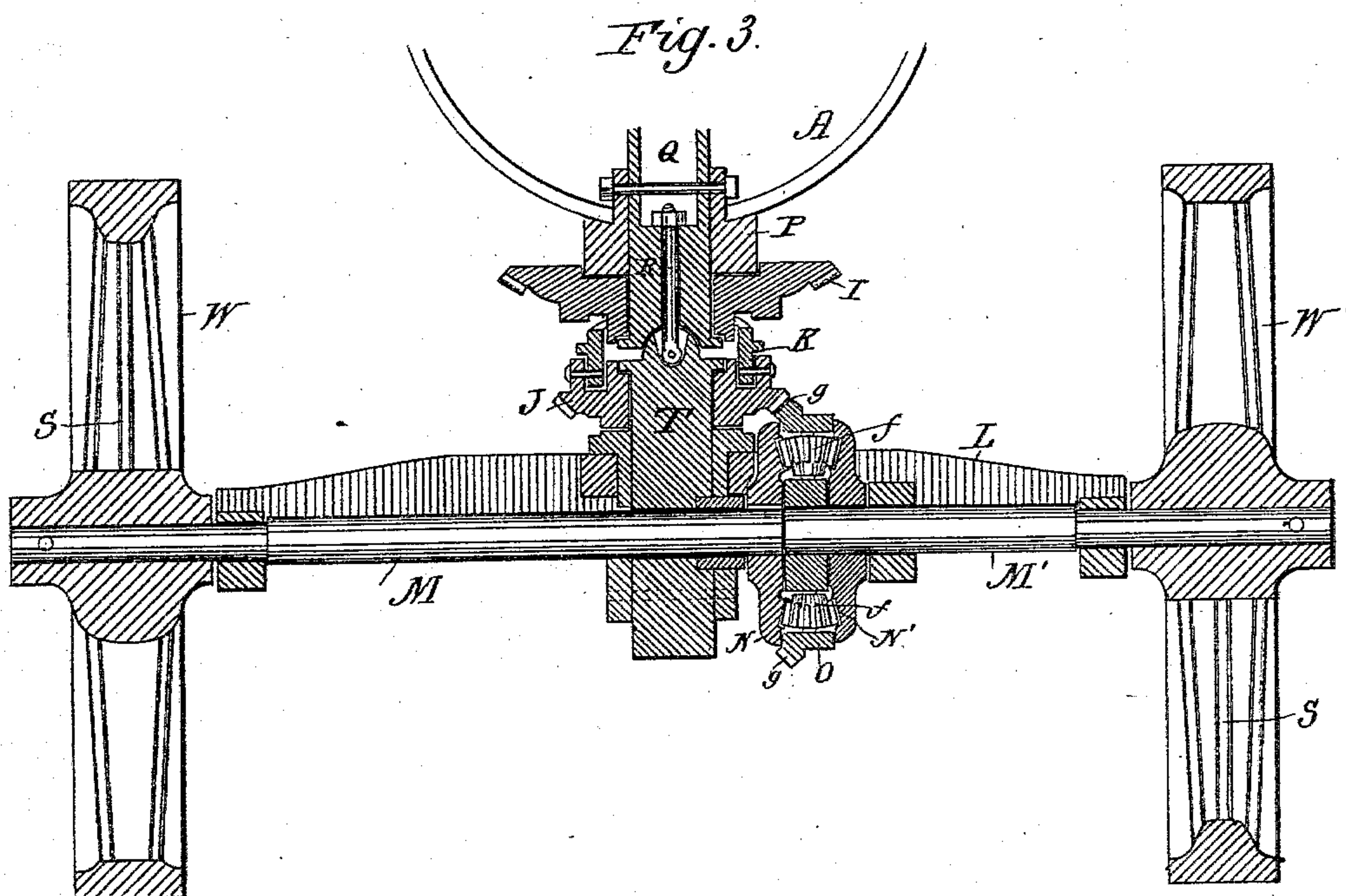
3 Sheets—Sheet 3.

L. E. BANDELIER.

TRACTION ENGINE.

No. 280,999.

Patented July 10, 1883.



WITNESSES:

*W. W. Hollingsworth*  
*Edw. C. Byrn*

INVENTOR:

*L. E. Bandelier*  
BY *M. C. [Signature]*

ATTORNEYS.



# UNITED STATES PATENT OFFICE.

LOUIS E. BANDELIER, OF NEW HAVEN, INDIANA.

## TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 250,999, dated July 10, 1883.

Application filed April 14, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS EMMET BANDELIER, of New Haven, in the county of Allen and State of Indiana, have invented a new and useful Improvement in Traction-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation with one of the rear wheels removed. Fig. 2 is an underneath view, with the rear compensating-gear in section. Fig. 3 is a vertical transverse section of the engine, taken through the front axle. Fig. 4 is a side view of the rear compensating-gear.

The object of my invention is to provide an improved construction of traction-engine which will secure a more uniform distribution of the weight and strain of the engine upon the supporting-wheels; and it consists in the improved construction and arrangement of parts whereby all four of the running-wheels are made to act as drivers, as will be fully described hereinafter.

In the drawings, A represents the boiler of a traction-engine.

B B are the two hind wheels, which are loosely connected to short axles C C, whose inner ends are made of segmental shape, and are bolted to the boiler.

To each of the two rear wheels is fastened a ring, *a a*, having inwardly-projecting gear-teeth. One of these ring-gears engages with a pinion, *b*, on a shaft, D, and the other engages with a pinion, *b'*. The pinion *b'* and shaft D are each rigidly connected to separate disks E E', which have bevel-teeth on their adjacent faces, and engage with the small bevel-pinions *c c c c*, set in the intermediate wheel, F, on axes at right angles to the shaft D. This gear-wheel F receives motion from the crank-shaft of the engine through a pinion and counter-shaft, (not shown,) and the function of the wheel F is to transmit said motion to either or both of the rear drive-wheels, forming a compensating-gear which allows independent motion of the two hind wheels in turning curves, &c. This compensating-gear is already well known, and I do not claim it or deem it neces-

sary to further describe it. In accordance with my invention, however, I make the intermediate wheel, F, in the form of a hollow wheel with removable side F', which houses the disk E, that is fastened to shaft D, and on the side F' of the hollow gear-wheel F is formed a circular series of bevel-teeth, *d*. These teeth *d* are made to engage with a bevel-wheel, G, on a shaft, H, which runs in a nearly horizontal longitudinal position beneath the boiler. At the forward end of this shaft H is keyed a bevel-pinion, *e*, which engages with a horizontal bevel-wheel, I, which rests beneath the front end of the boiler. This bevel-wheel is connected to a lower bevel-wheel, J, by a gimbal-jointed connection, K, which allows a rocking motion between the boiler and its front support, and this lower bevel-wheel, J, is carried upon the front axle-frame, L. This frame has attached to it the front axle, which is made in two independent sections, M M', one of which, M, is attached rigidly to one of the front wheels, W, and the other of which, M', is rigidly attached to the other of the front wheels, W'.

Upon the inner adjacent ends of the two sections M M' of the front axle are firmly fastened, so as to be rigid therewith, disks N N', which have bevel-teeth on their inner faces, and between these revolves loosely a third disk, O, bearing several bevel-pinions, *f f*, which mesh alike with the bevel-teeth of both the disks N N', and constitute with them a compensating-gear of a similar character to the one before described.

At the outer periphery of the intermediate wheel or disk, O, are formed a series of bevel-teeth, *g*, that mesh with and derive motion from the horizontal bevel-wheel J above.

For making a firm connection beneath the front end of the boiler without allowing any weight to come on the gimbal-joint, a plate, P, is attached to the same, and has a cylindrical portion extending up into the smoke-box in front of the boiler. In this fits and is held a sleeve, Q, which is bolted or pinned to said cylindrical portion, and is held to the lower bearing or king-bolt, T, by a swiveling link-rod, R, forming a sort of ball-and-socket joint, which prevents the front end of the boiler from rising up and getting off the axle. The



king-bolt T extends through the axle-frame, and is perforated to receive one of the sections of the front axle.

From this description it will be seen that I  
5 take the power of the engine on gear-wheel F and distribute it partly to the hind wheels through the rear compensating-gear, and then by the shaft H, with bevel-wheels G, e, I, and J, I distribute said strain also to the front  
10 wheels through their compensating-gears, still permitting each wheel of each pair to be entirely independent of the other, so as to facilitate turning.

For combined strength and lightness, traction-engine wheels are usually made with radial steel rods for spokes, and when a rotary strain is imparted to the wheel a ring-gear is usually placed sidewise against said wheel, and this ring-gear distributes the strain sufficiently  
20 around the wheel to relieve the spokes of any twisting strain. When, however, the motion is imparted to the wheels through the rotary or torsional strain of the axle, as is the case with my front wheels, the spokes are very apt  
25 to be twisted out of their sockets. To prevent this I arrange between the two series of radial spokes in each front wheel braces S, which are arranged at an angle to the spokes, so as to resist any lateral deflection of the inner ends  
30 of the latter from the torsional strain of the axles.

For turning the front axle about its vertical center in steering, any suitable gearing may be employed.

35 I am aware that it is not new to impart the driving-power of the engine to all four wheels through the instrumentality of two compensating-gears; but I do not know that these

gears have been connected by an inflexible shaft, H, having its forward end arranged to travel in a concentric path about the front pivotal support.

Having thus described my invention, what I claim as new is—

1. The combination of the boiler, the front wheels having independent axles, with compensating-gear between, the horizontal gear-wheels I and J, with gimbal-jointed connection, the shaft H, with gear-wheels G and e, and the driving mechanism for the rear wheels, substantially as shown and described.

2. A compensating-gear having its intermediate wheel, F, provided with two sets of gear-teeth, one set of which receive the power which moves it, and an external series of teeth, d, on its side for transmitting motion to another set of driving-wheels, substantially as described.

3. The combination, with a boiler and an axle supporting the front end of the same, of a plate, P, having an elongated chamber extending up into the smoke-box, a sleeve, Q, fitted therein, and a tie rod or link for holding the boiler down upon the axle, as shown and described.

4. The combination, with the driving mechanism of a traction-engine and an axle through which the driving strain is transmitted, of a traction-wheel fixed rigidly on said axle and provided with radial spokes, and oblique or angular thrust-braces S, arranged between the two rows of spokes of the wheel, substantially as and for the purpose described.

LOUIS EMMET BANDELIER.

Witnesses:

SOLON C. KEMON,  
CHAS. A. PETTIT.