(No Model.) 3 Sheets—Sheet 1.

F. F. LANDIS.

TRACTION ENGINE.

No. 366,226. Patented July 12, 1887.

Fig. 1.

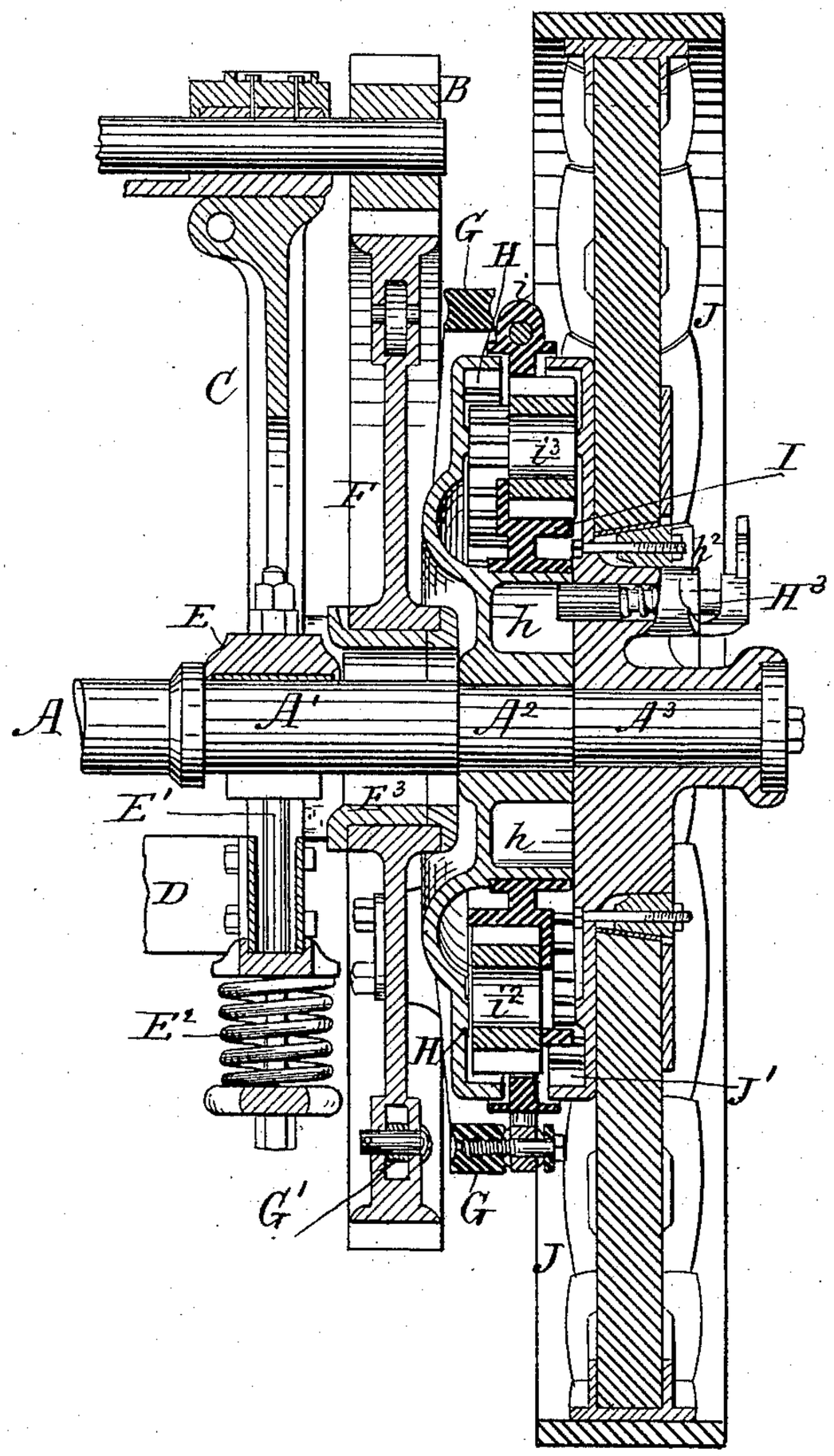
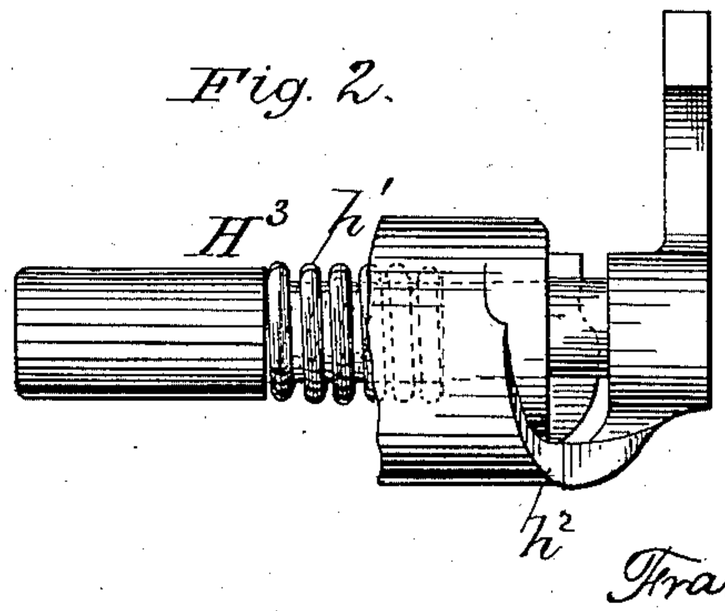


Fig. 2.



WITNESSES:

F. H. Knight

A. B. Landis

INVENTOR:

Frank F. Landis

by E. E. Masson

atty.

(No Model.) 3 Sheets—Sheet 2.

F. F. LANDIS.

TRACTION ENGINE.

No. 366,226. Patented July 12, 1887.

Fig. 3.

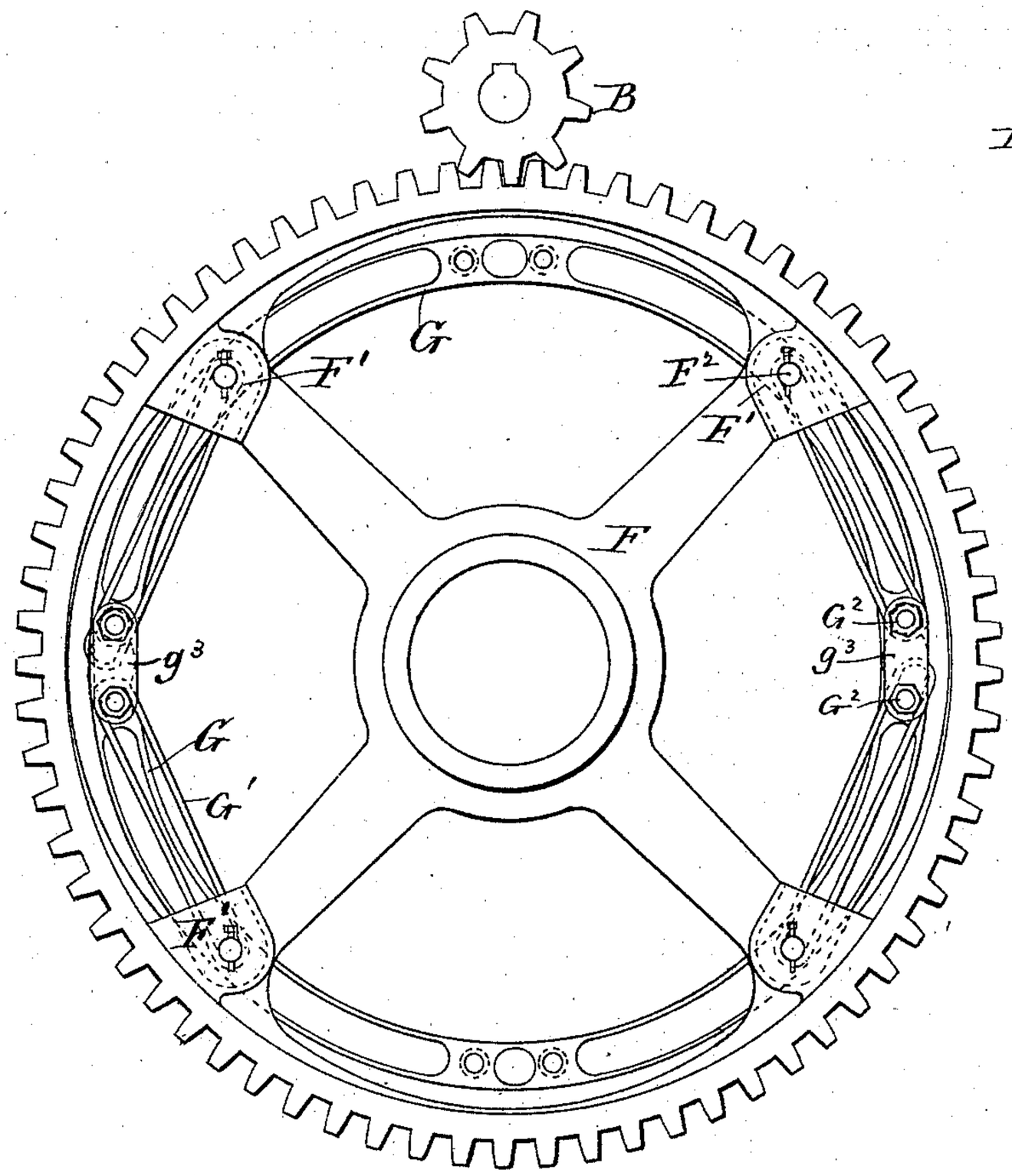


Fig. 4.

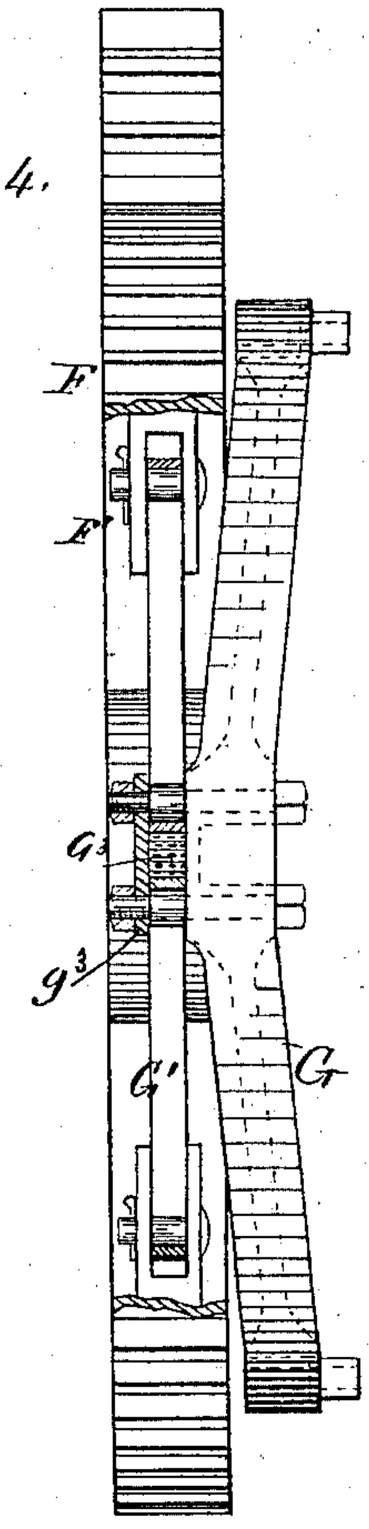
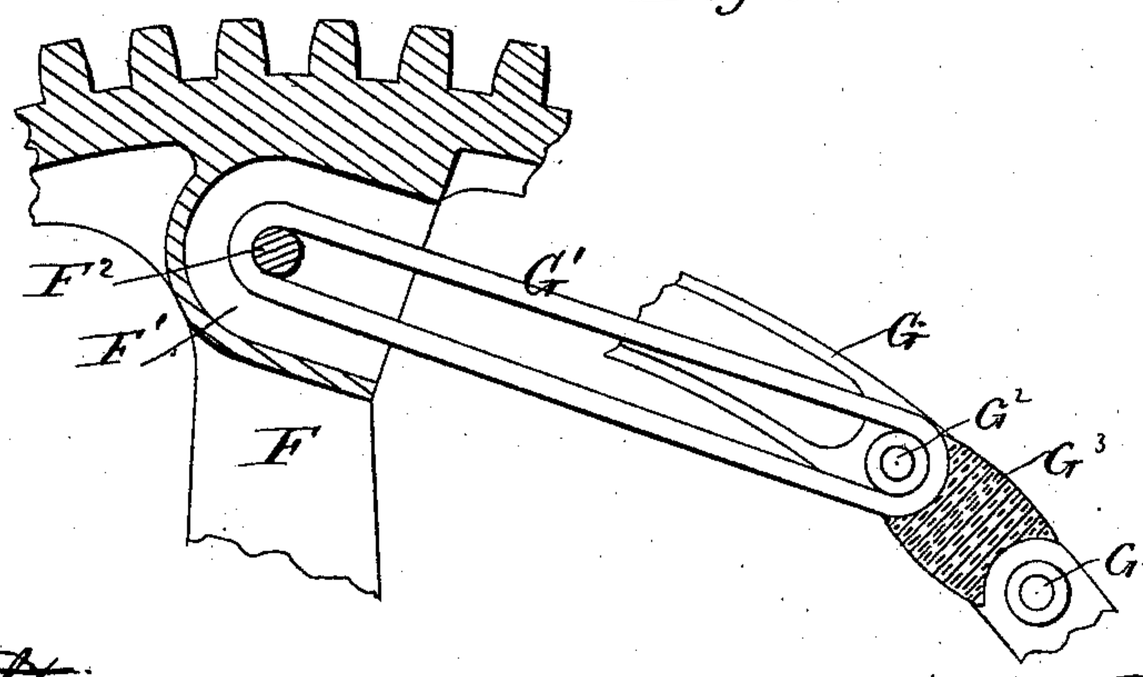


Fig. 5.



WITNESSES
F. H. Knight
A. B. Landis

INVENTOR
Frank F. Landis
by E. E. Masson
Attorney

(No Model.) 3 Sheets—Sheet 3.

F. F. LANDIS.

TRACTION ENGINE.

No. 366,226. Patented July 12, 1887.

Fig. 6.

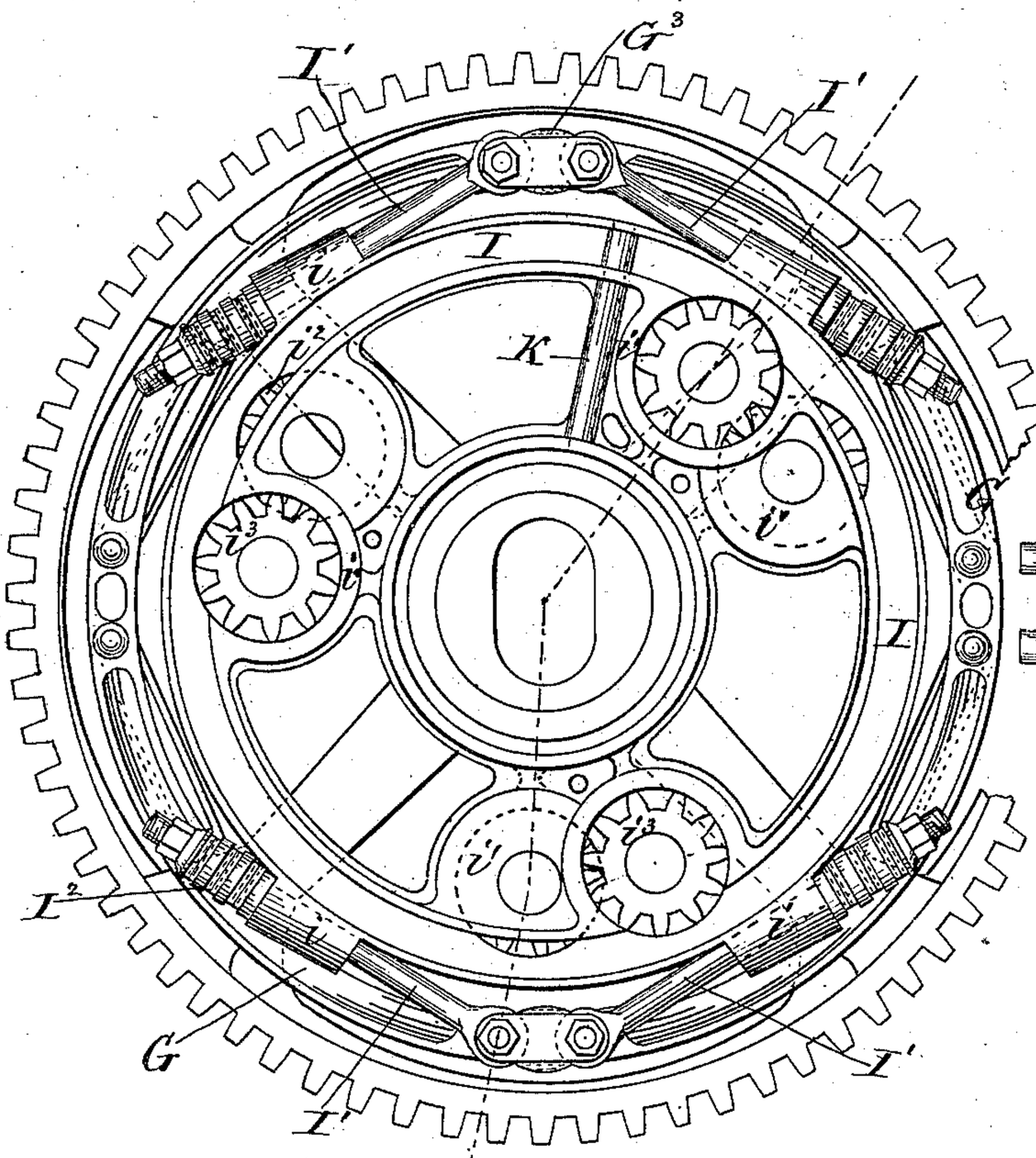


Fig. 7

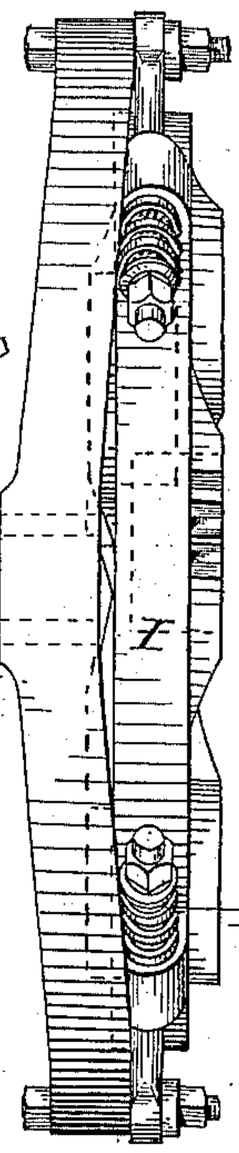


Fig. 8.

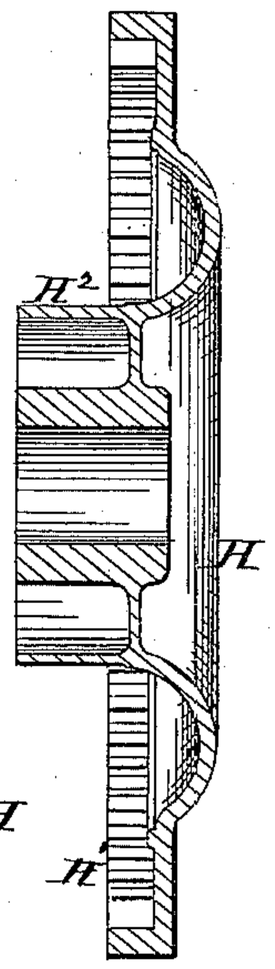
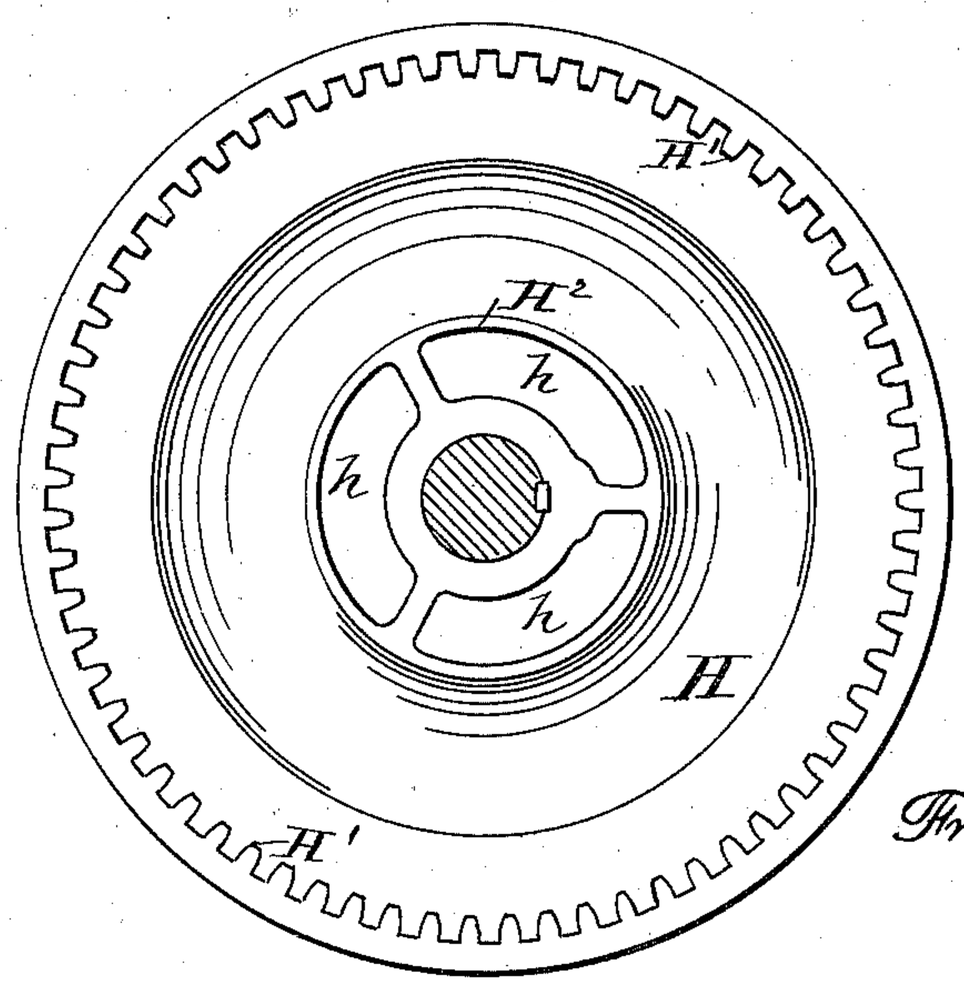


Fig. 9.



WITNESSES:
F. H. Knight
C. B. Landis

INVENTOR
Frank F. Landis
by E. E. Masson
Attorney

UNITED STATES PATENT OFFICE.

FRANK F. LANDIS, OF WAYNESBOROUGH, PENNSYLVANIA.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 366,226, dated July 12, 1887.

Application filed March 21, 1883. Serial No. 88,970. (No model.)

To all whom it may concern:

Be it known that I, FRANK F. LANDIS, a citizen of the United States, residing at Waynesborough, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Traction-Engines, of which the following is a specification.

My invention relates to the connecting mechanism between the ground-wheel and counter-shaft of a traction-engine; and it has for its objects the new arrangement therewith of compensating gear and means whereby a constant operative contact is maintained of each of the elements of the train of gearing employed, and a simultaneous freedom of oscillation in all directions of the boiler-supporting frame-work and of the main or traction axle.

Other important objects will appear in the following description, and the novel features of construction will be specifically set forth in the claims.

Referring to the drawings forming a part hereof, Figure 1 is a central vertical section of the principal elements employed. Fig. 2 is a detail view of a coupling-pin; Fig. 3, an inside elevation of a portion of the elements comprising the master-gear, gimble-ring, and their connecting-links; Fig. 4, an edge view of the master-gearing and links, partly broken away; Fig. 5, an enlarged detail view of one of the links and its connections; Fig. 6, an outside elevation of the master-gear, gimbal-ring, and compensating gear; Fig. 7, an edge view of the gimbal-ring and compensating gear; Fig. 8, a central vertical section in reversed relative position to Fig. 7 of the fixed axle-gear, and Fig. 9 an inside elevation of the same.

Like letters indicate like parts in all the figures.

I will remark that portions not fully described nor claimed herein are embraced in my patent, No. 286,312, of October 9, 1883.

The main elements shown, at least in part, are the axle A, counter-shaft pinion B, housing C, boiler-supporting frame-work D, and axle-bearing E, supporting the frame-work by suspension-rods E′, cushioned by springs E^2. The construction and interdependence of these parts, as well as that of the hollow bearing E^3 and the master-gear F, are fully set forth in the above-mentioned cases, and, furthermore, may be such as is well known in the art of traction-engine construction.

The remaining elements are the gimbal-ring G, the compensating gear I, comprising several subsidiary elements shown collectively in Fig. 6, the fixed axle-gear H, the traction-wheel gear J′, and the traction-wheel J.

The axle is preferably constructed with three shoulders, which determine three bearings, $A' A^2 A^3$, for the frame-work suspension-bearing E, the fixed axle-gear H, and the ground wheel J, the latter being fitted to rotate upon the axle independently of the mechanism when not coupled to the fixed gear H by the pin H^3, as shown and readily understood, the pin being forced into one of the chambers *h* of the gear H by the coiled spring *h′*, and withdrawn therefrom by the lever secured thereto riding the incline h^2, formed upon the hub of the traction-wheel. It will thus be seen that, the journals of the counter-shaft and the hollow bearing E^3 being fixed to the housing C, as in my Patent No. 266,698, the master-gear F and pinion B are always in operative contact and unaffected by any oscillation of the axle and its attached gear and traction-wheel. To provide for the conduction of power from a motor through the counter-shaft and master-gear to the traction-wheel and to render the engine self-propelling, and at the same time to make allowance for said oscillations of the axle and its attached parts, I connect them by a gimbal-ring in the following manner: Some (at least four) of the spokes of the master-gear are constructed or provided with pockets F′, through which pass transversely bolts F^2, which are embraced by open links G′, the opposite ends of which embrace bolts G^2, by which the links are connected and secured loosely to the gimbal-ring G. The pockets are concave interiorly at the bottom and are of such dimensions as to loosely receive the ends of the links G′ transversely and permit free movement thereof in all other directions, said movement being limited outwardly by the bolts F^2.

The pockets are arranged in pairs, each one of each pair opening toward its mate, and the two links from each pair of the pockets are

secured to the gimbal-ring at points thereon diametrically opposite and between the pockets from which they protrude.

A cushion, G^3, of rubber or other more or less yielding substance, is placed between the ends of the links upon the gimbal-ring, and tie-plate g^3 prevents lateral displacement of the cushion. If desired, the cushion G^3 may be omitted, as one of its objects is simply to prevent rattling of the parts. A rubber cushion may also be placed in the bottom of each pocket F'.

It is clear that in operation those ends of the links which are in the pockets and in front in line of the direction of the rotation of the master-gear will be drawn snugly against the bolts passing through said pockets, and the opposite ends of such links will be drawn snugly against the bolts, which they embrace upon the gimbal-ring, and thus convey to said ring rotation in a corresponding direction to that of the gear, while at the same time the links, being pivotally connected to the master-gear and the gimbal-ring, permit of a vertical oscillation of the axle and its attached elements—viz., the fixed gear, gimbal-ring, intermediate compensating gear, and the traction-wheel.

The fixed gear H is provided with internal gear-teeth, H', and a bearing, H^2, upon which is fitted, so as to revolve thereon, an intermediate compensating-gear case, I, connected by links I', passing through lugs i on the case, to the gimbal-ring at diametrically-opposite points, and midway between the points of attachment of the links G' connecting the gimbal-ring to the master-gear.

Outside of the lugs i the links I' are shown as provided with springs I^2; but these may be dispensed with and solid blocks of wood or metal substituted, if desired. By this construction the motion given to the gimbal-ring is conveyed to the compensating-gear case.

The traction-wheel J is provided with an internal gear, J', and the compensating-gear case I is provided with an oiling-pipe, K, extending from its periphery to its bearing.

The gear-case I is provided with three pairs of pockets, i', and these may be increased or diminished in number, if desired, the construction, arrangement, and operation of a single pair being merely repeated in each additional pair. The pockets are arranged at and near the rim of the case, and one of each pair projects into the other and inwardly beyond its mate.

In the inner pocket is a pinion, i^2, and in its mate is a pinion, i^3, meshing therewith. These pinions in this instance revolve upon their peripheries, supported by the walls of the pockets, though it is manifest that studs or journals may be provided for them, if desired. Now, it is clear that the motion given the case by the gimbal-ring and links may be communicated to the inner pinion of each pair. Taking a single pair, for clearness, this pinion (the inner) may communicate the motion thus received in two directions—viz., to the internal gear, H', of the fixed gear H, with which it meshes, and thus rotate the axle, or to its mate i^3, and thence to the internal gear, J', of the traction-wheel J, with which gear the pinion i^3 meshes, and thus rotate the traction-wheel upon the axle.

It being understood that the opposite traction-wheel is fixed to the axle A, it will be seen that as the power is communicated in either one of the above-described directions either wheel of the engine will be rotated independently of the other, and the continuance as to time or distance of this independent rotation depends upon whether the wheel J is or is not connected to the fixed gear H by the pin H^3. If connected and the pin is at the back end of one of the chambers h, independent rotation of the wheel J may be continued until the pin reaches the front end of the chamber. In other words, about one-third of the tire will have traversed the tracks. If the pin be withdrawn and the wheel disconnected, independent rotation may be continuous. Another feature to be considered is the different rates of speed produced by the different elements employed or brought into action in communicating the power from the master-gear to the axle or traction-wheel.

Referring to the facts that the compensating-gear case is loosely journaled on the hub or bearing H^2 of the fixed gear, it will be seen that it may have a rotation independent of the fixed gear, but that if the rotation of said gear and case are equal in speed the meshing of the pinion i^2 with the gear H' is non-active by reason of said uniformity in rotation. For the same reason pinion i^3 does not rotate, and its meshing with the internal gear, J', of the traction-wheel is also non-active, except as a means of connection between the fixed gear H, and the gear J', so that the fixed gear-shaft and traction-wheel rotate in common with each other. At the instant of the occurrence of a difference in the speed of rotation of either the fixed gear or the traction-wheel J independent rotation of the pinions i^2 i^3 takes place, and the power is communicated through them to rotate either the fixed gear and axle or the traction-wheel J.

It is well known that in the act of turning the outer wheel of a pair travels over more ground than the other. Take, for example, the opposite traction-wheel to that shown as being the inside wheel when turning. It being fixed to the axle lessens the speed of rotation of the fixed gear. This brings into independent action the following train of gearing: The pinion i^2 i^3 and internal gear, J', of the traction-wheel J and the fixed gear being relatively much larger than the pinion, and the internal gear, J', being relatively smaller than the master-gear driven by the small pinion B on the counter-shaft, the rotation of the traction-wheel J is not only independent of the axle and opposite fixed traction-wheel, but greatly increased in speed, so that said trac-

tion-wheel J traverses more ground than when both are rotated uniformly. A reversal in the direction of turning causes a reversal in the operation of the elements involved.

This invention is related to the machines shown and described in the patents granted to me August 23, 1881, No. 246,019, January 10, 1882, No. 252,044, and October 31, 1882, No. 266,698, and is an improvement thereon.

Having described my invention and its operation, what I claim as new, and desire to secure by Letters Patent, is—

1. In a traction-engine, the combination of a master-gear journaled upon a fixed portion of the frame-work of said engine, an axle having three shouldered bearings, $A' A^2 A^3$, a spur-gear, H, secured upon the bearing A^2 and provided internally with cogs having their faces parallel with the axis of said gear, and a hub forming a journal for the compensating-gear case, with the compensating-gear case having three pairs of spur-pinions between the gear H and the traction-wheel, substantially as and for the purpose described.

2. In a traction-engine, the combination of a master-gear, a gimbal-ring, and compensating-gear case connected by links with an axle provided with a fixed gear having chambers *h*, a loosely-journaled traction-wheel, intermediate compensating gears, and a locking-pin, substantially as and for the purpose described.

3. In a traction-engine, a master-gear provided with pockets F′, adapted to receive the ends of gimbal-ring connecting-links, in combination with a gimbal-ring, substantially as described.

4. In a traction-engine, the combination of a master-gear provided with pockets, slotted links secured loosely in the pockets, and a gimbal-ring provided with cushioning devices against the ends of the links secured thereto, substantially as and for the purpose described.

5. In a traction-engine, the combination of a master-gear provided with pockets, links secured loosely in said pockets and to a gimbal-ring, and links secured to said gimbal-ring and to a compensating-gear case, substantially as described.

6. In a traction-engine, a compensating-gear case provided with inwardly and outwardly projecting pinion-pockets and peripheral lugs, a central bearing, and an oil-pipe extending from the periphery to the bearing, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK F. LANDIS.

Witnesses:
D. M. GOOD, Jr.,
C. E. BESORE.