2 Sheets—Sheet 1.

J. C. SPINDLER & F. L. FAIRCHILD.

Traction Engine.

No. 232,375. Patented Sept. 21, 1880.

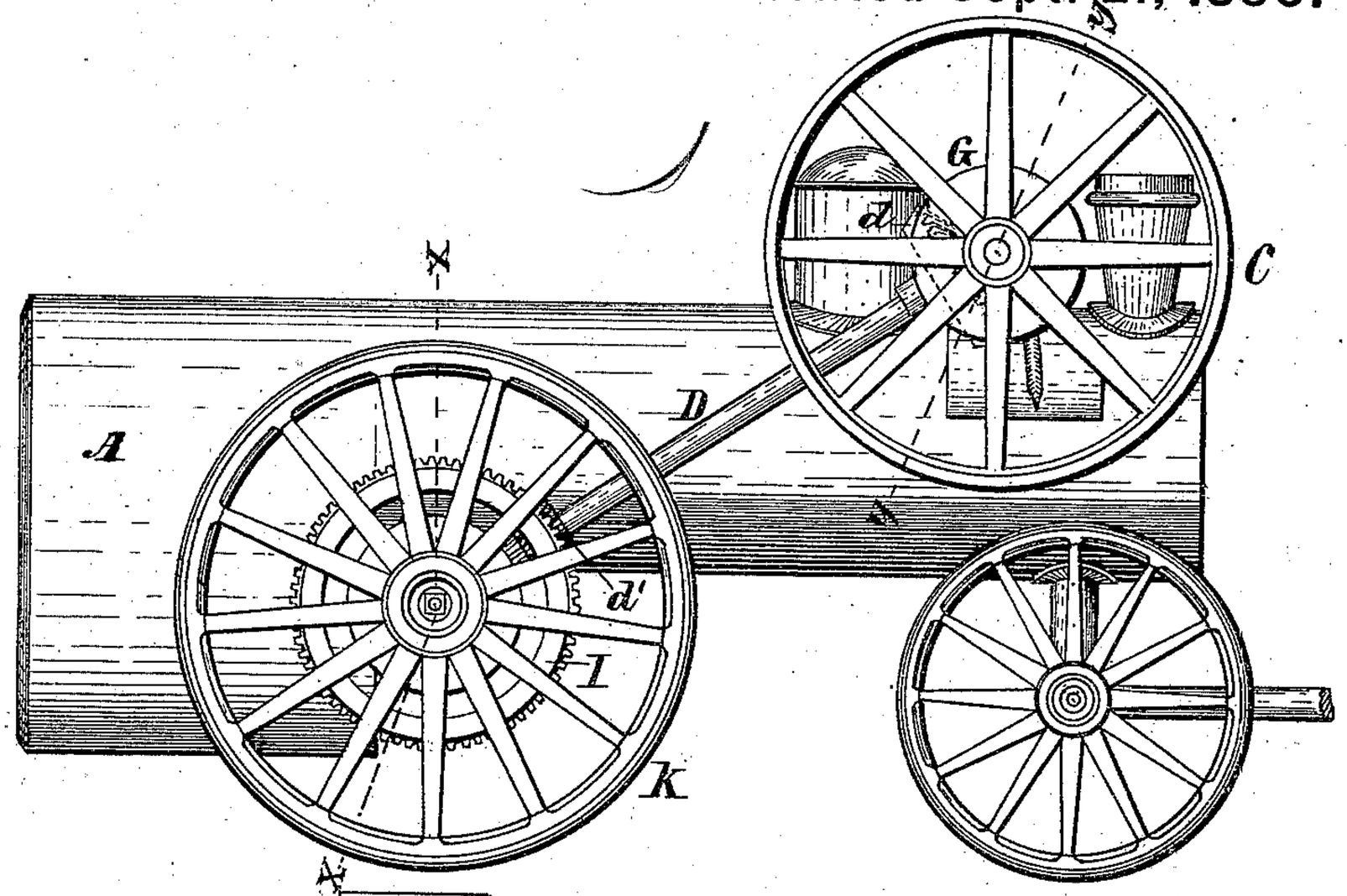

Fig 1

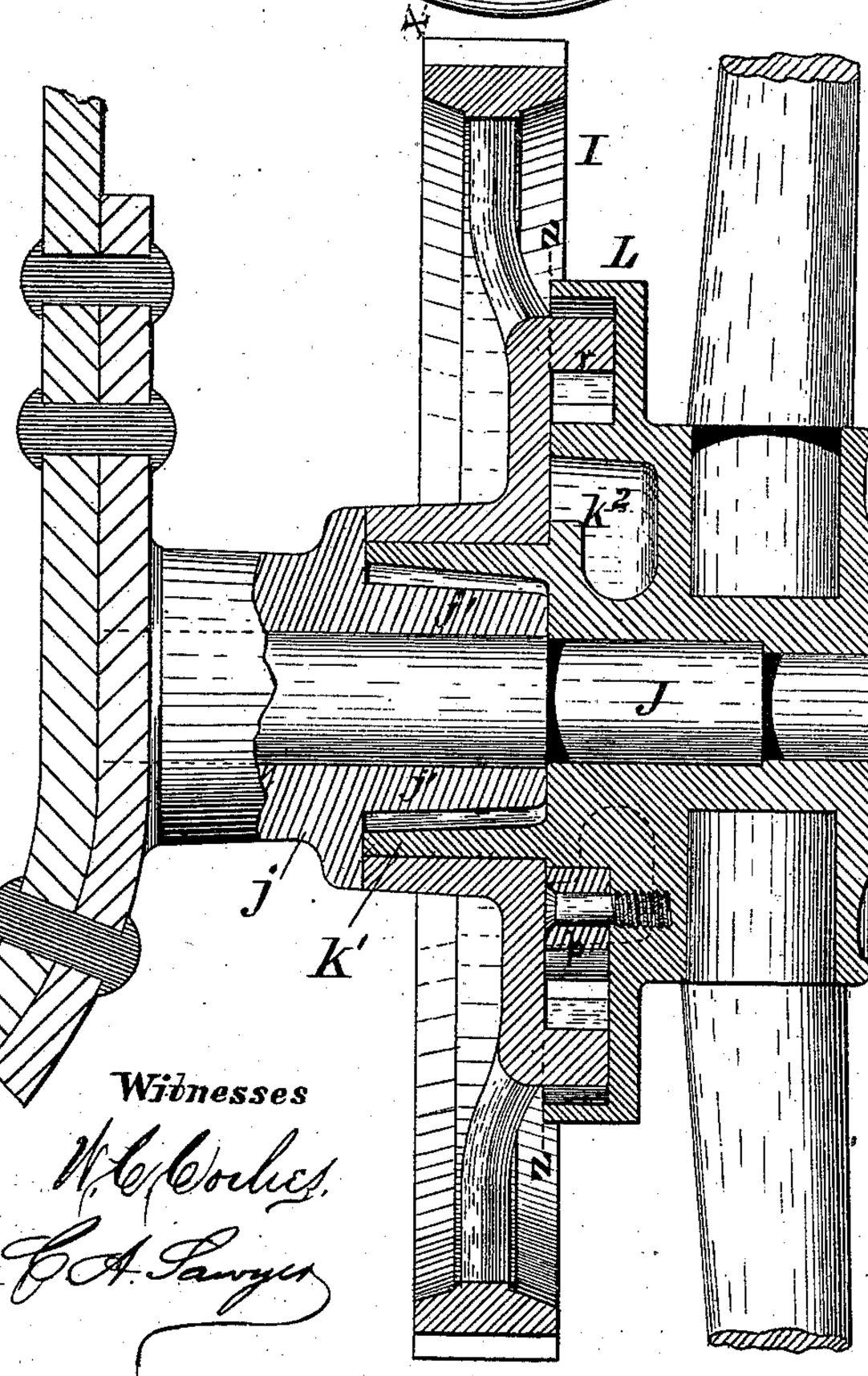

Fig 2

Witnesses

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Fig 5

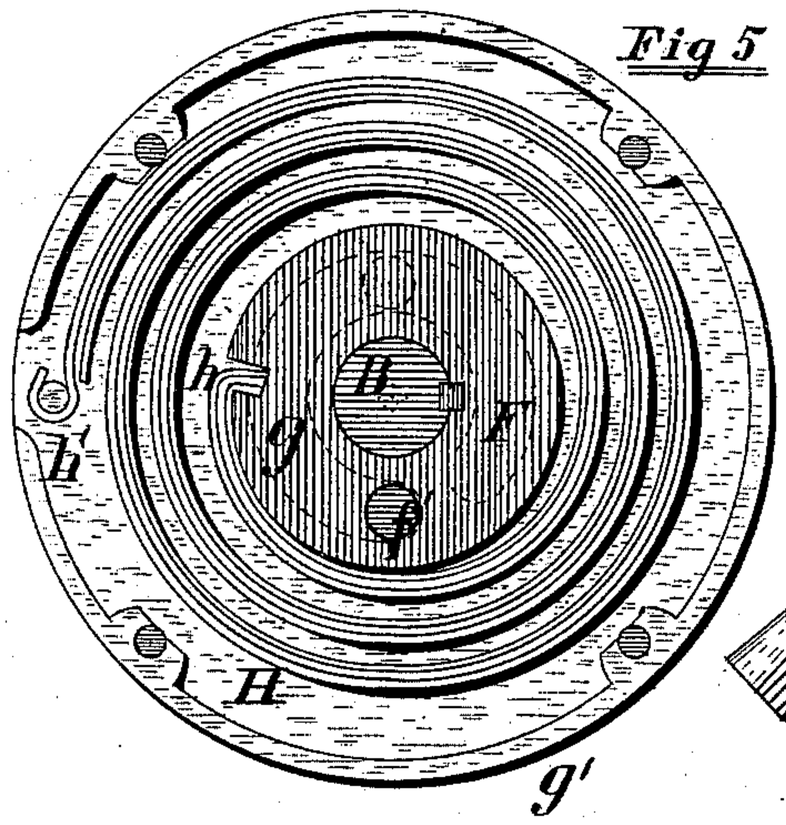
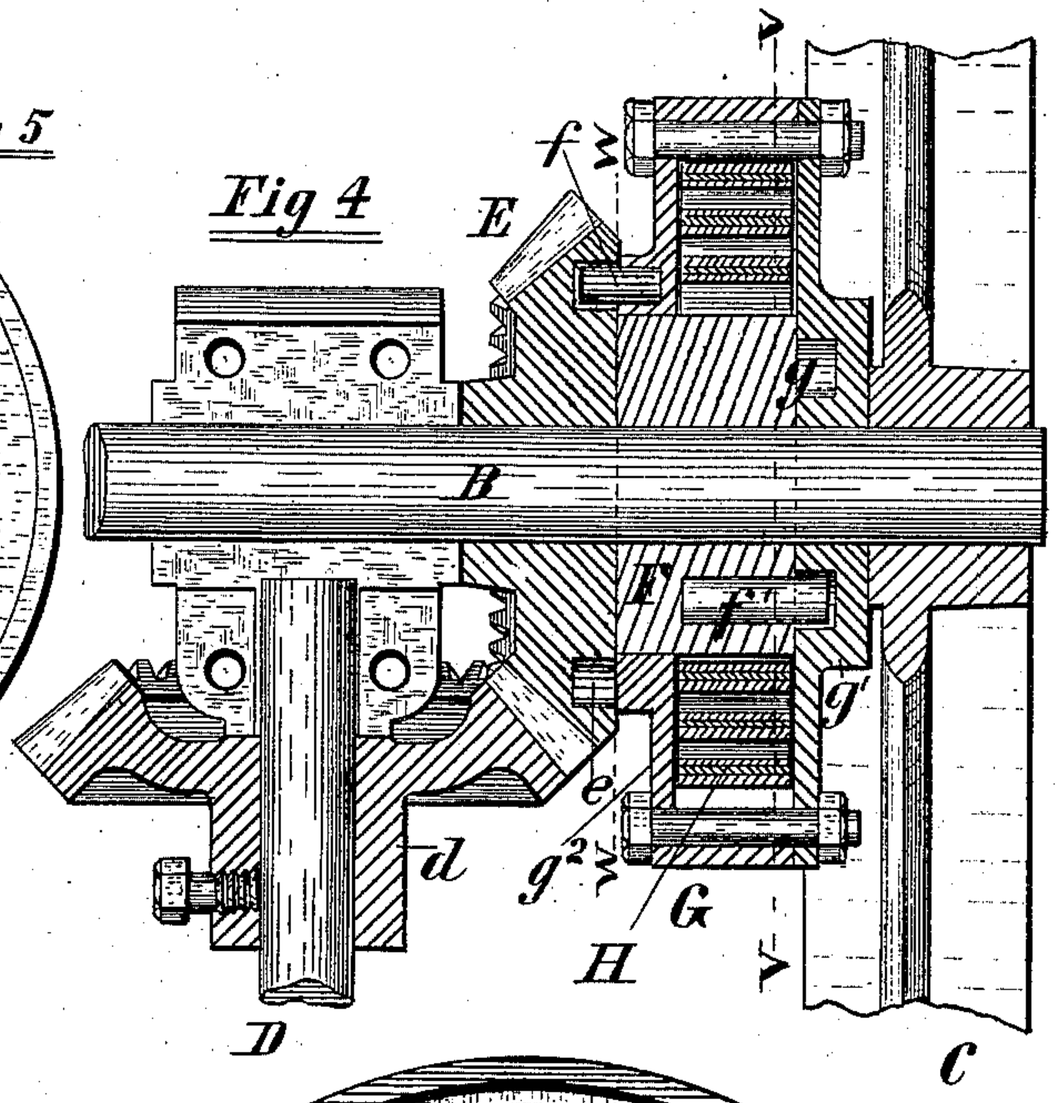


Fig 4



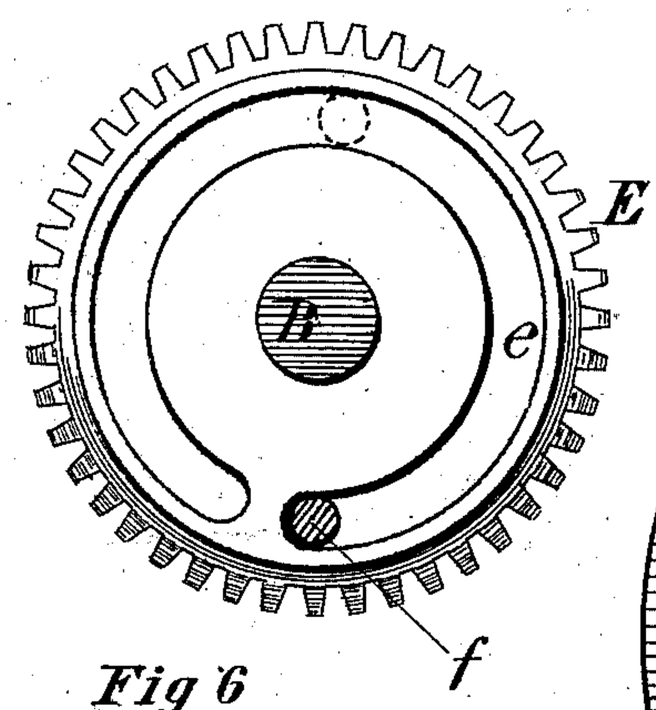
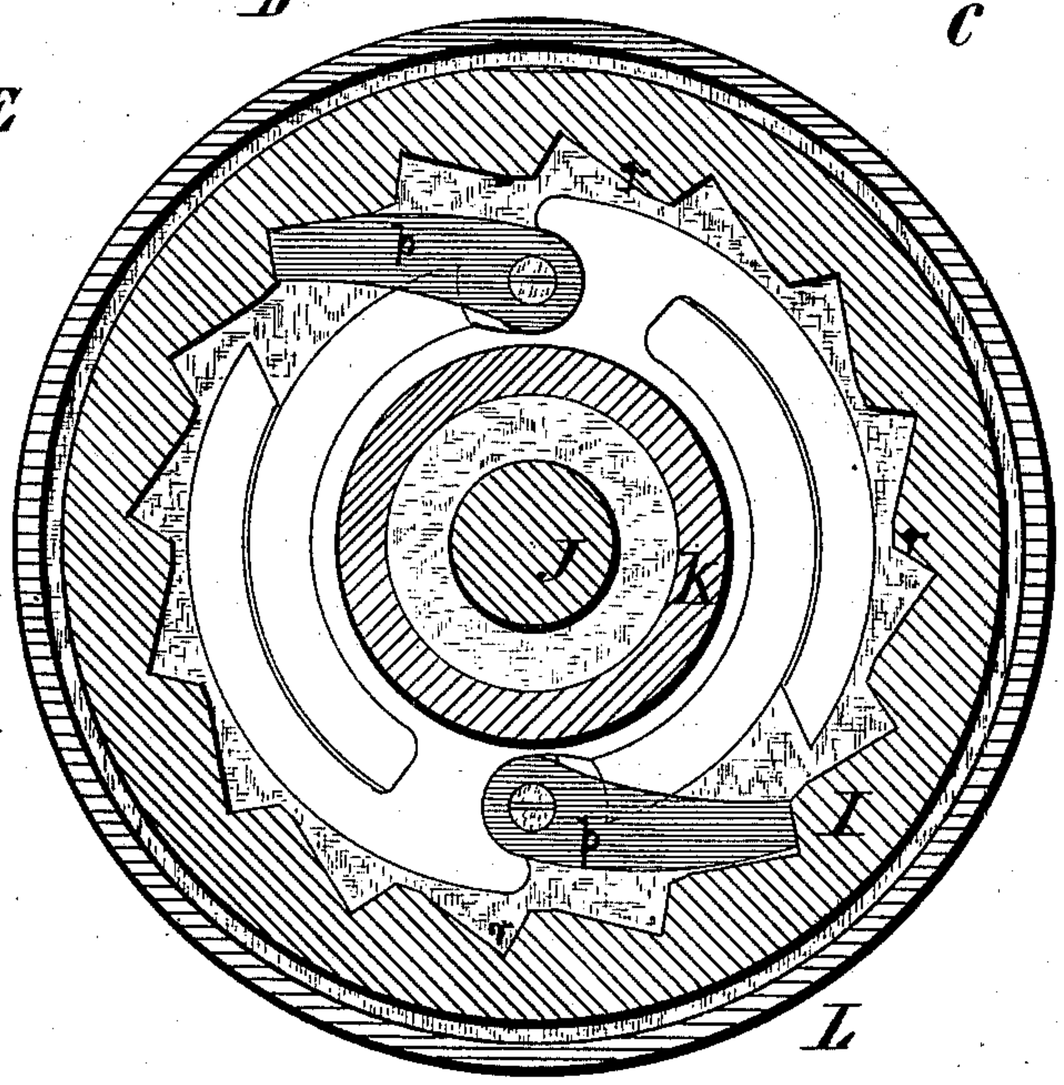


Fig 6

Fig 3



Witnesses

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UNITED STATES PATENT OFFICE.

JOHN C. SPINDLER AND FRANK L. FAIRCHILD, OF MOUNT VERNON, OHIO, ASSIGNORS TO C. COOPER, GEORGE ROGERS, F. L. FAIRCHILD, AND C. G. COOPER, ALL OF SAME PLACE, ONE-FOURTH TO EACH.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 232,375, dated September 21, 1880.

Application filed January 16, 1879.

To all whom it may concern:

Be it known that we, JOHN C. SPINDLER and FRANK L. FAIRCHILD, of Mount Vernon, in the county of Knox and State of Ohio, have invented a new and useful Improvement in Traction-Engines, which is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of an engine with such parts shown as are necessary to illustrate the nature of our improvements; Fig. 2, a detail vertical section, on an enlarged scale, of the wheel, taken on the line *x x*, Fig. 1; Fig. 3, a similar view looking outward, taken on the line *z z*, Fig. 2; Fig. 4, a similar view of a portion of the main shaft and driving-pinions, taken on the line *y y*, Fig. 1; Fig. 5, a transverse section taken on the line *v v*, Fig. 4, and Fig. 6 a similar view taken on the line *w w*, Fig. 4.

Our invention relates to improvements in the mechanism by means of which the engine is made self-propelling.

The invention consists in providing the hub of the rear supporting wheel or wheels with an inwardly-projecting flange, on which the driving gear-wheel is mounted.

It also consists in providing a spring-connection between the main engine-shaft propelling-gear, whereby the shock is taken up in passing over rough ground, and a limited amount of motion is permitted in the engine-shaft when starting, before the propelling-gearing is brought into operation.

It also consists in various devices and combinations of devices, all of which will be hereinafter fully described, and more definitely pointed out in the claims.

We have applied our improvements to that particular class of self-propelling engines in which the rear truck-wheels are driven by an inclined shaft at one side of the engine, extending from the main engine-shaft to the rear axle or counter-shaft, when the latter is used, although our improvements are not necessarily limited to this particular kind of driving mechanism, but are applicable to engines provided with propelling-gear differently constructed and arranged.

The main features of the engine and propelling mechanism above referred to are well known, and will be referred to herein only for the purpose of clearly showing the construction and operation of our present special improvements.

In the drawings, A represents the boiler of the engine, and B the main engine-shaft, which is provided with the fly-wheel C. An inclined shaft, D, is mounted in suitable bearings at one side of the engine, and carries at its upper end a bevel-gear wheel, *d*, which meshes with a bevel-pinion, E, mounted loosely on the main engine-shaft. In the back of this pinion E a circular groove, *e*, is cut, extending nearly around the pinion, as shown in Fig. 6 of the drawings.

A hub, F, is rigidly secured to the main shaft B. On the outer face of this hub there is a pin, *f'*, which is arranged to enter a groove, *g*, in the hub *g'* of a circular casing, G. This hub is mounted loosely on the engine-shaft, and the groove therein is similar in construction to that in the pinion E—that is, it extends nearly around the hub.

The inside g^2 of the casing G is mounted loosely on the hub F, and the two parts of the casing are secured together by suitable bolts. It will be seen, therefore, that the circular case G is free to move within certain limits upon the engine-shaft and hub F. To the inside part of the casing G is attached a pin, *f*, which projects into the circular groove *e* in pinion E.

Within the case G is coiled a spring, H, the inner end, *h*, of which is fastened to the hub F, while the outer end, *h'*, is secured to the case, as shown in Fig. 5 of the drawings.

At the lower end of the inclined shaft D is a bevel-pinion, *d'*, which, in Fig. 1 of the drawings, is represented as engaging directly with the driving gear-wheel I, which communicates motion to the truck-wheels through the medium of a pawl-and-ratchet attachment, the ratchet *r*, as shown in Fig. 3, being in this in-

stance on the wheel I, and the spring pawl or pawls *t* on the hub of the truck-wheel. This mode of connecting the wheel I and the truck-wheel, which permits independent or slip motion of the truck-wheel independently of the driving gear-wheel I, when occasion demands, is well known, and requires no further explanation.

The construction shown in patent of George Rogers, No. 173,498, may be substituted, however—that is, a counter-shaft may be employed with pinions gearing into the driving-wheels on the truck-axle, the said counter-shaft driven by the inclined shaft.

In Fig. 2 of the drawings the wheel I is represented as constructed to gear with a pinion on such a counter-shaft, and in this same figure the axle J of the rear truck-wheel is represented as a short or stub axle fastened to the boiler or fire-box of the engine.

The hub *k* of the rear truck-wheel is provided with a flange, *k'*, projecting inwardly on the inside of the wheel, and constituting the bearing for the drive-wheel I, which is mounted loosely on the flange *k'*, and connected with the truck-wheel hub by the pawl-and-ratchet attachment, as before explained, and as shown in Figs. 2 and 3 of the drawings.

The flange *k'* extends over an enlargement, *j*, of the axle; but an open annular space is left between this enlargement and the flange, as shown in the drawings, so as to avoid all unnecessary friction.

A shoulder, k^2, is provided at the hub end of the flange, against which the gear-wheel I rests when in position. The wheel is also provided with a casing, L, which surrounds or overhangs the pawls *p* and the ratchet *r;* but as this feature of construction forms no part of our present invention it is not necessary to describe it in detail here.

It has been found by experience that when traction-engines are run over a rough road or field there is danger of breaking the gearing or some portion of the propelling mechanism by the severe shock when striking or passing over an obstacle, and this difficulty is increased by the movement of the fly-wheel, which is, of course, in motion when the propelling mechanism is in operation.

It has also been found that in a traction-engine with a single crank and cylinder some annoyance and delay are occasioned by stopping on the center; and also, the engine in starting has no chance to gain motion before it commences to pull its load, but there is a dead pull at the very start of the engine.

All of these difficulties are obviated by the spring attachment which we introduce between the engine-shaft and the inclined shaft; for it is evident that if when moving along the truck-wheels strike an obstacle or drop into a rut there will be sufficient yielding in the gearing connecting the engine-shaft and the inclined shaft to prevent breakage.

Whenever the engine stops the reaction of the coiled spring will be sufficient to turn the crank past the center, and when the engine is first started up it is evident that the engine-shaft will make nearly one revolution before the pin *f* will be in position to turn the bevel-pinion E, and then there will be the winding up of the spring before the engine commences to pull its load, which will altogether give a free start of nearly two revolutions before the parts are brought into working position to move the engine.

Heretofore the driving gear-wheel I (which must be loose or independent of the truck-wheel and connected therewith by pawl and ratchet, or equivalent means, so as to allow the truck-wheel to have movement independently thereof when occasion demands) has been mounted on the axle, and as it usually turns with the truck-wheel, additional friction is thereby occasioned, and also the bearing is worn away by dust and dirt working in around it, thereby disturbing the true position of the wheel and impairing the successful operation of the propelling mechanism. By mounting the gear-wheel on the flange of the hub, as above described, we obviate this difficulty; for as the gear turns with the truck-wheel it will have no movement about its bearing on the flange except when turning corners or when the engine is drawn by horses.

The spring attachment to the gearing may be placed on the inclined shaft instead of the engine-shaft, and other changes may be made in details without departing from the essential features of our improvements.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a traction-engine, the combination, with the single-crank engine-shaft, the incline-shaft, and gearing connecting the two, of a spring attachment, forming part of the connecting-gearing, and arranged and operating to permit movement, to a limited extent, of the driving-shaft independently of the incline-shaft, as and for the purposes hereinbefore set forth.

2. The main engine-shaft B and its hub F, provided with a pin, *f*, in combination with the grooved casing G, mounted loosely on the shaft, the coiled spring H, the loose bevel-pinion E, provided with a groove engaged by the pin *f* on the casing, and the bevel-wheel *d* on the incline-shaft, substantially as herein-before set forth.

3. A single-crank engine-shaft, B, provided with fly-wheel C and hub F, with pin *f'*, in combination with the incline-shaft D, having a bevel-wheel, *d*, at its upper end, the loose bevel-pinion E, grooved as specified, the grooved loose casing G, provided with pin *f*, and the coiled spring H, substantially as and for the purposes hereinbefore set forth.

4. The truck-wheel with hub projecting on

the inside of the wheel, in combination with the driving-wheel I, mounted loosely on said projecting portion of the hub and connected with the truck-wheel by mechanism which will permit slip or independent movement of the truck-wheel with respect to said driving-wheel, as and for the purposes hereinbefore set forth.

5. The wheel-axle J, provided with an enlargement, *j*, in combination with the truck-wheel hub having an inner flange, *k'*, extending over the enlargement *j*, but with an annular space between them, and the driving gear-wheel I, loosely mounted on the hub-flange, substantially as described.

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