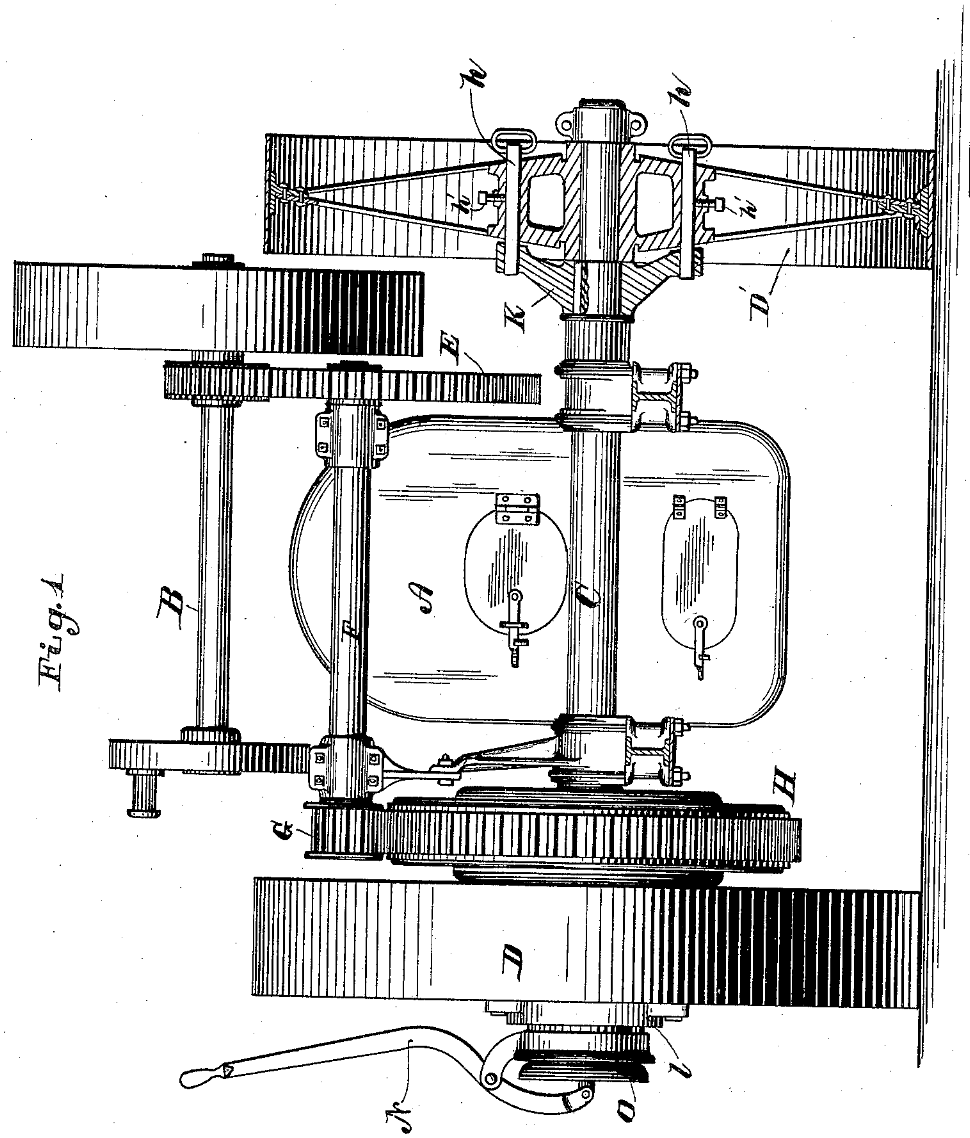
(No Model.)

3 Sheets—Sheet 1.

O. W. KELLY & L. F. DIETER.

TRACTION ENGINE.

No. 306,403. Patented Oct. 14, 1884.



Attest

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By their Attorney

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N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 2.

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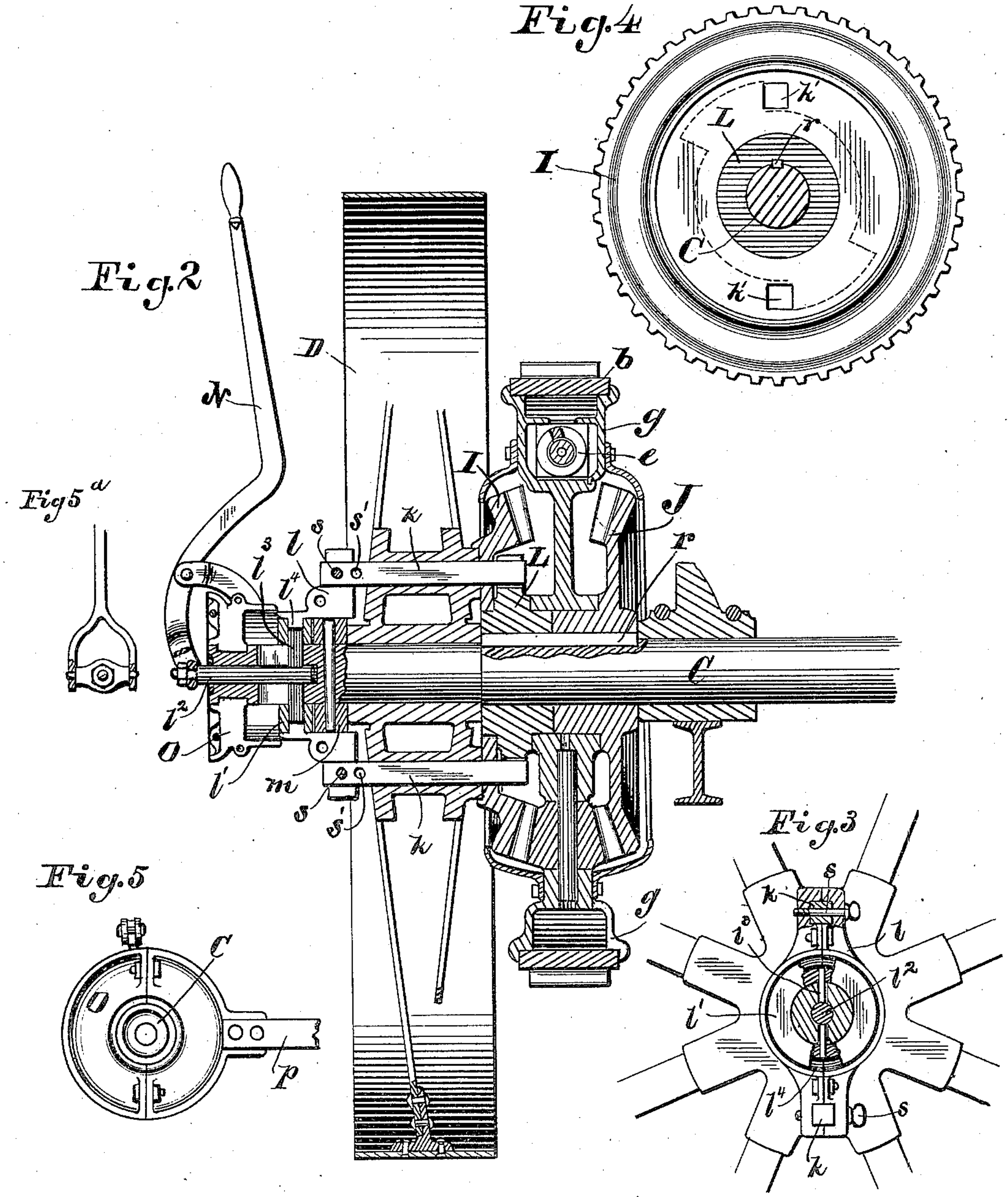

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Fig. 11

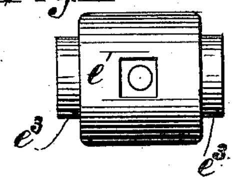


Fig. 10

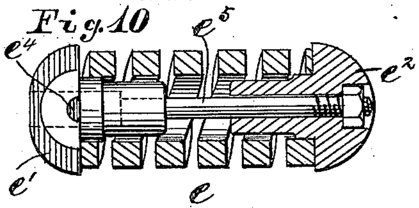


Fig. 9

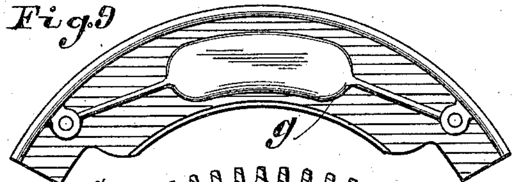


Fig. 6

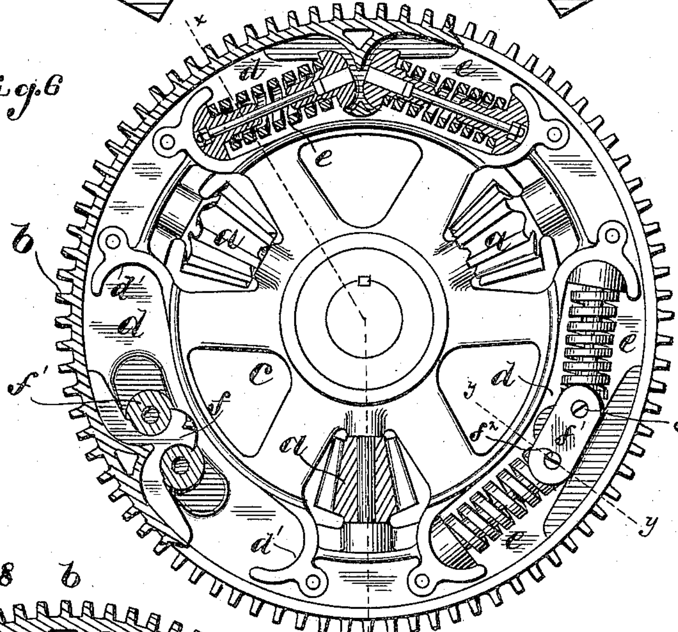
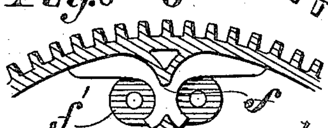


Fig. 8 b



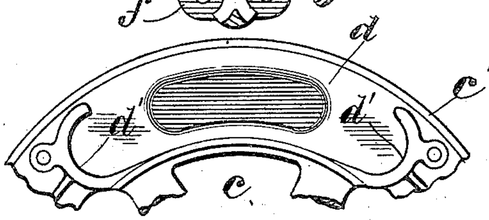
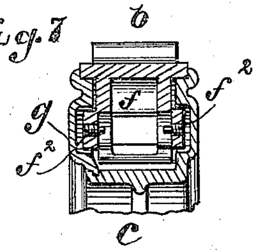


Fig. 7



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Inventors
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and Louis F. Dieter
By their Attorney
Paul A. Staley

UNITED STATES PATENT OFFICE.

OLIVER W. KELLY AND LOUIS F. DIETER, OF SPRINGFIELD, OHIO, ASSIGNORS TO THE SPRINGFIELD ENGINE AND THRESHER COMPANY, OF SAME PLACE.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 306,403, dated October 14, 1884.

Application filed March 4, 1884. (No model.)

To all whom it may concern:

Be it known that we, OLIVER W. KELLY and LOUIS F. DIETER, both citizens of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Traction-Engines, of which the following is a specification.

Our invention relates particularly to the intermediate driving mechanism between the crank-shaft of the engine and the traction-wheels; and it consists in the novel organizations and combinations of mechanism hereinafter described and claimed.

In the accompanying drawings, which form a part of this specification, Figure 1 is a rear elevation view of a traction-engine embodying our invention, some of the parts being shown in section. Fig. 2 is a vertical longitudinal sectional view through the main axle, showing the compensating gearing and the compound elastic gear in connection with the traction-wheel. Figs. 3 to 5 and 8 to 11, inclusive, are detailed views of some of the various parts, which will be more particularly referred to hereinafter. Fig. 6 is a side elevation of the compound elastic gear with the side covers removed, the rim being shown partly in section. Fig. 7 is a sectional view of the same, taken on line *y y* in Fig. 6.

Like parts are indicated by similar letters of reference throughout the several views.

In said drawings, A represents the boiler; B, the crank-shaft of the engine; C, the main axle, and D and D′ the traction-wheels. The power to drive the traction-wheels is transmitted from the crank-shaft B by means of a pinion on said shaft, which engages with a spur-gear, E, on one end of a counter-shaft, F, and from the counter-shaft by a pinion, G, to what we term the "compound elastic gear" H on the main axle C, from thence to the traction-wheels D and D′, as hereinafter more fully described. The compound elastic gear H is not secured to the axle C, but is adapted to turn loosely thereon. It is provided with pinions *a*, which engage upon either side with bevel-gears I and J, forming the compensating-gear. Of these bevel-gears the one, J, is connected rigidly to the axle by a feathered key, *r*, and the other one, I, turns loosely thereon. The loose bevel-gear I is normally connected to the traction-wheel D in the manner hereinafter described. The other traction-wheel, D′, is normally connected to the axle C. By this construction the power from the compound elastic gear H is transmitted equally to the two traction-wheels, but allows of an independent movement of the said wheels in turning corners, this being a well-known way of accomplishing this result.

In order to avoid any undue strain or shock upon the gearing in running over inequalities in the road or from a sudden checking of the traction-wheels from any cause, it is essential that the power be supplied to said traction-wheels through an elastic or yielding connection, thereby imparting to said wheels a yielding or elastic strain. Several ways have heretofore been employed for doing this. The most common way consists in establishing an elastic connection between the loose compensating-gear and its traction-wheel by means of springs or otherwise. We accomplish this result by means of our compound elastic gear H, which is shown in detail in Figs. 6 to 11, inclusive. The rim *b* of this gear is cast in a single piece and is independent of the center portion or spider *c*. The spider *c* contains bearings for the pinions *a* of the compensating-gear, the centers of all of said pinions being in a vertical plane which passes centrally through the teeth of the gear. Between the respective pinions we provide in the spider, near its outer rim, a series of pockets, *d*, formed in the same plane with the said pinions *a*, and adapted to contain springs *e*, by means of which a yielding or elastic connection is established between the outer rim, *b*, and the spider *c*. The springs *e* being thus in the same vertical plane with the compensating-pinions *a*, are in the central line or plane of the direct strain imparted to the gear-rim *b*. The springs *e* are provided at their respective ends with clips or supports e' and e^2, which have bearing, respectively, against the rim *b* and spider *c*. The rim-clips e' are provided on either side with trunnions e^3, which rest in bearings in the lugs *f*, cast on the inner side of the toothed rim *b*. These clips e' are held in place against said lugs f by small screws f', which pass through side pieces, f^2, and engage in semicircular notches e^4 in the trunnions e^3. These side pieces, f^2, are cast on the lugs f and extend each way over the bearings of trunnions e^3. The spider-clips e^2, on the other ends of the springs, rest in semicircular bearings d', formed at each end of the respective pockets d, the ends of said clips being rounded to fit said bearings. Oscillating bearings are thus formed at each end of the springs, which enable the springs to adjust themselves at different angles to correspond to the different degrees of compression. Two springs are placed in each pocket, as shown, said springs extending, respectively, from either side of the lugs f to the respective ends of the pockets d. It will be seen that a yielding connection is thus established from each side of the lugs f on rim b to the spider c. A rotary strain imparted to the rim b in either direction is therefore imparted to the spider c, and to pinions a, through the medium of an elastic or yielding connection, which connection is located in the center of the direct strain.

The clips of the respective springs are preferably connected together by a rod or bolt, e^5, which extends through the center of the springs, each of said bolts being provided at one end with screw-threads and a nut by which the tension of the respective springs may be adjusted before they are placed in the pockets d. The head of each bolt e^5 is let into the clip e' for some distance to provide for the longitudinal movement of the bolt when the spring is compressed. The outer or toothed rim, b, has a bearing at one side on a shoulder or offset, c', on the periphery of the spider c, and at the other side, on a similar shoulder formed in a cover, g, which is secured by bolts or otherwise on the side of the spider c. The rim b is thus held securely against vertical or lateral movement, but is capable of a rotary movement about the spider c. The cover g extends down over the pockets and thus completely incloses the springs e. The cover is preferably made in sections, as shown in Fig. 9, there being as many sections as there are pockets d. The springs, being thus inclosed, are kept free from dirt or grit, and the cover g being made in sections any pocket may be opened and the springs examined or oiled without opening the other pockets or removing the rim b.

As before stated, the traction-wheels D and D′ are both adapted to turn loosely on the axle C, one of said wheels, however, being normally connected to said axle, and the other to the loose bevel-gear I.

The connection between the traction-wheel D′ and the axle C is established by pins h, adapted to slide through bearings in the hub of said traction-wheel, and to engage with a clutch or dog, K, said dog K being keyed rigidly to the axle. By withdrawing the pins h from the dog K, the traction-wheel D is left free to turn upon the axle.

Means are provided for holding the pins h from longitudinal movement when in either position of adjustment, small set-screws h' h' being preferably used for this purpose.

The connection between the traction-wheel D and the loose gear I is established by means of pins k k, which extend through the hub of said traction-wheel and enter holes k' k' in the gear I. (See Figs. 2 and 4.) The traction-wheels are thus normally connected to the bevel-gears I and J, respectively, each independent of the other. The compensating-pinions a, meshing at either side with the respective gears I and J, will impart motion equally to both traction-wheels when the engine is going straight ahead. In turning, however, the bevel-gear connected to the traction-wheel on the inner side of the curve will remain stationary, or nearly so, while the pinions a traverse its teeth and thus impart a correspondingly-accelerated speed to the outer wheel. This independent or compensating movement of the traction-wheels is necessary in turning or in changing the course of the engine; but it is essential that means be provided for connecting the traction-wheels rigidly together, so that in case more resistance is offered to one traction-wheel than the other the engine will not run out of its course. For instance, suppose from the nature of the ground one traction-wheel could exert little or no traction while the tractive power of the other wheel remains unimpaired. The wheel, thus deprived of its tractive power, would remain stationary and the compensating-pinions would traverse the teeth of its bevel-gear, thus imparting an accelerated speed to the other traction-wheel, which would result in throwing the engine out of its course.

In order that the engineer may have perfect control of the engine at all times, it is desirable that the means employed for connecting the traction-wheels rigidly together be such that the wheels may be so connected or disconnected by the engineer from his position at the rear of the boiler and without stopping the engine. This we accomplish in the following manner: A clutch, L, is located on the axle C between the loose bevel-gear I and the compound elastic gear H. This clutch L is rigidly secured to the axle by the same feathered key r which secures the bevel-gear J, the hubs of the said gear and clutch being extended respectively, and turned off to form a bearing for the compound elastic gear H. The loose bevel-gear I is preferably journaled on the other end of the clutch L, as shown in Fig. 2. We are thus enabled to secure larger bearings for the respective wheels H and I, and also a greater amount of bearing-surface for the clutch L and bevel-gear J on the axle C. The sliding pins k k, which connect the traction-wheel D with the loose bevel-gear I, are adapted to slide through holes k' k' in said gear I and to engage with the clutch L, thus connecting the traction-wheel D with the axle C. The form of the clutch L is such that the pins may be slipped through the gear I, and thus be made to engage with said clutch while the engine is running. The contour of the clutch L is shown in dotted lines in Fig. 4. The outer ends of the pins k k are secured to opposite sides of a sliding collar, l, adapted to slide back and forth on a rigid collar, m. This rigid collar m is keyed to the axle C, and serves to hold the traction-wheel D against lateral movement on the axle. The sliding collar l is connected to a hand-lever, N, which extends upward at the side of the wheel D within easy reach of the engineer. The hand-lever N is supported on a collar, O, on the end of the axle C. This collar O is preferably made in halves, and is provided with an annular projection adapted to engage in a groove in the axle C, and thus prevent any lateral movement of said collar on the axle. The collar O is held stationary by a strap, p, (see Fig. 5,) which extends around in front of the wheel D and connects with the frame of the boiler. The axle is thus free to revolve while the lever N remains stationary.

To provide for the reciprocating movement of the sliding collar l in throwing the pins into or out of engagement with the clutch L, and at the same to permit of the rotary movement of said sliding collar with the wheel D, we place upon the axle C an annularly-grooved collar, l', secured on the end of a plunger, l^2, by a key, l^3. This plunger l^2 is connected at its outer end to the lower end of the hand-lever N, and extends longitudinally through the center of the axle C to a point near the rigid collar m. The key l^3, which secures the collar l' to said plunger, extends through a slotted opening in the axle, thus permitting a longitudinal movement of said plunger and collar.

The sliding collar l is preferably made in halves, and is provided with an annular projection, l^4, which fits in the annular groove in the periphery of the collar l'. It will be seen that a connection is thus established between the lever N and the sliding collar l, which admits of a rotary motion of said clutch, and which communicates a reciprocating movement to said sliding collar when the lever N is moved forward or back. Means are thus provided whereby the engineer is enabled to connect or disconnect the traction-wheels in such a manner that they will turn rigidly together, the operation of connecting or disconnecting said wheels being performed by the engineer without stopping the engine or leaving his post. The connection between the lever N and plunger l^2 must be such as will permit of a rotary movement of the plunger while the lever remains at rest. This is preferably accomplished as shown in Figs. 2 and 5[a], the end of the lever being bifurcated and provided with a cross-piece, into which the end of the plunger is journaled in such a manner that it is capable of a rotary movement in said cross-piece, but is held against any longitudinal movement therein. The lever N is adapted to draw the pins k back far enough to disengage them from the clutch L, but not through the bevel-gear I. If it is desired to entirely disconnect the traction-wheel D from the gearing, the small bolts s, which serve to hold the pins k in place in the sliding collar l, are withdrawn and the pins drawn out until clear of the gear I.

We have provided the pins k k with a set of extra holes, s', (see Figs. 2 and 3,) adapted to receive the small bolts s. These holes are so placed that when the pins k are drawn back through the gear I the bolts s may be inserted in said holes, and thus hold the said pins in the new position in the sliding collar l.

It is evident that greater latitude might be given to the movement of the sliding collar l, whereby the pins k would be adapted to be drawn back entirely through the gear I by the movement of the hand-lever N, means being provided for limiting the movement of said lever, and for holding it in different positions of adjustment. By such an arrangement the lever N could be adapted to connect or disconnect the traction-wheels while the loose gear I remains normally connected with the traction-wheel D, and also to entirely disconnect the traction-wheel D from the gearing. The gear I, however, will generally remain connected to the traction-wheel D, except when it is desired to pull the engine by horses, and in this case it will be little trouble to remove the bolts which secure the pins in place and to withdraw the said pins from the gear.

Having thus described our invention, we claim as new and original and desire to secure by Letters Patent—

1. The combination, with the compensating mechanism of a traction-engine, of a compound elastic gear composed of a center portion or spider, an outer toothed rim capable of a rotary movement about said spider, springs placed centrally in and inclosed by said compound gear for connecting said rim and spider, and pinions journaled in said spider in the same plane with said springs, said pinions being adapted to engage on either side with the respective compensating-gears, whereby an elastic rotary strain is transmitted centrally to said pinions and equally upon the respective compensating-gears, substantially as specified.

2. The combination, with an outer toothed rim, b, provided on its inner surface with lugs f, and a spider, c, provided with pockets d, into which said lugs project, of springs e, extending each way from the lugs f, and provided at each end with clips adapted to oscillate in bearings in the said lugs and in the ends of the said pockets, respectively, substantially as and for the purpose set forth.

3. The combination, with the toothed rim b, having lugs f, and the spider c, provided with pockets d, of the springs e, clips or supports e'

e^2, and bolts e^5, each of said clips e' being provided with trunnions e^4, adapted to fit in bearings in said lugs *f*, and each of said clips e^2 being rounded off and seated in bearings in the ends of said pockets *d*, substantially as set forth.

4. In a traction-engine, the combination, with the traction-wheels adapted to turn independently of each other and a revolving clutch adapted to connect said wheels, so they will turn rigidly together, of a stationary hand-lever supported independently of the revolving mechanism, and means for connecting said lever and clutch, whereby said clutch may be engaged or disengaged by said stationary lever, substantially as specified.

5. The combination, with the axle C, having the gear-wheel J and clutch L, secured rigidly thereto, the gear-wheel I, adapted to turn loosely about said axle, and the traction-wheels D and D′, normally connected to the said loosely-turning gear I and to the axle C, respectively, of the hand-lever N, supported stationary on the end of said axle, and the pins *k k*, connected to said lever, said pins being supported in bearings in wheel D, and adapted to be moved into or out of engagement with said clutch L, substantially as specified.

6. In a traction-engine, the combination, with the traction-wheels D and D′, adapted to be independently connected to the respective compensating-gears I and J, of a clutch and stationary lever adapted to connect both of said traction-wheels and compensating-gears rigidly to the axle without stopping the engine, substantially as specified.

7. The combination, with the traction-wheel D, mounted loosely on the axle C, and provided with bearings for the pins *k k*, and the clutch L, secured rigidly to said axle, of the sliding collar *l*, to which the pins *k k* are attached, the hand-lever N, and means for connecting said lever to said sliding collar, substantially as and for the purpose set forth.

8. The combination, with the traction-wheel D, mounted loosely on the axle C, the clutch L, secured rigidly to said axle and having the gear I, journaled thereon, said gear being provided with the holes *k′ k′*, of pins *k k*, sliding in bearings in the wheel D, and adapted to engage with said clutch L, and to connect or disconnect said gear I with said wheel D, substantially as specified.

9. The combination of the wheel D, clutch L, axle C, sliding collar *l*, pins *k k*, grooved collar *l′*, plunger l^2, key l^3, collar O, and lever N, substantially as and for the purpose specified.

In testimony whereof we have hereunto subscribed our names this 27th day of February, A. D. 1884.

OLIVER W. KELLY.
LOUIS F. DIETER.

Witnesses:
PAUL A. STALEY,
P. J. CLEVENGER.