(No Model.) 2 Sheets—Sheet 1.

A. P. BROOMELL.

TRACTION ENGINE.

No. 307,265. Patented Oct. 28, 1884.

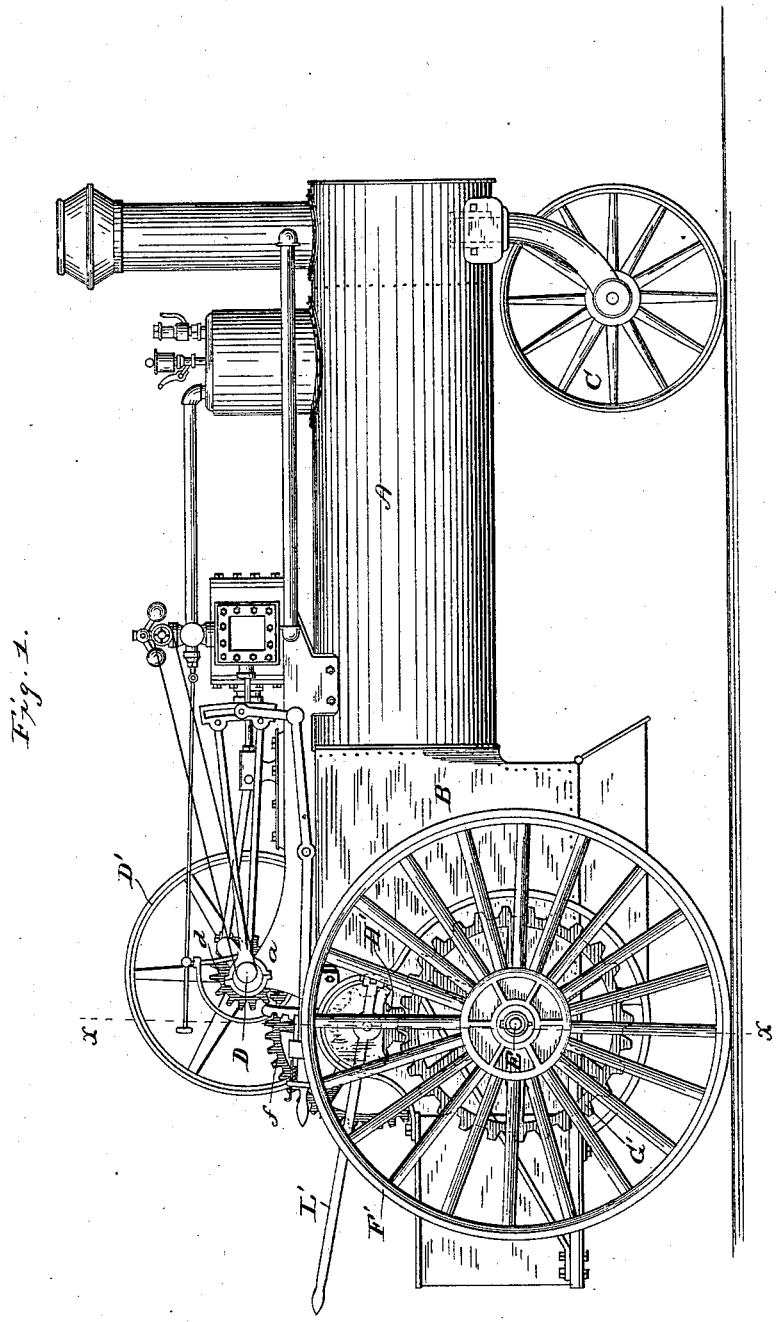

Fig. 1.

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Fig. 3.

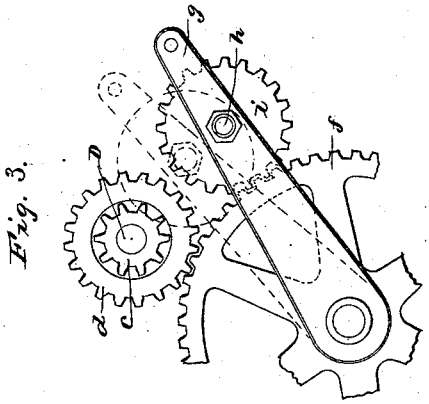


Fig. 4.

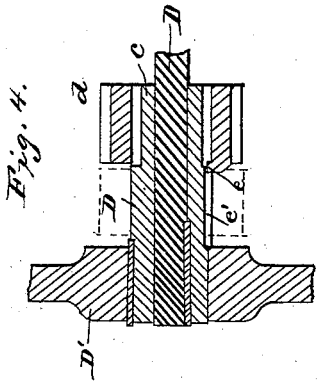
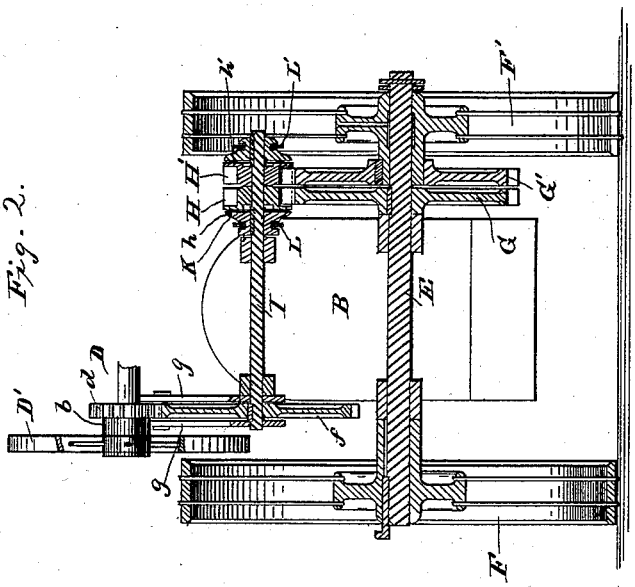


Fig. 2.



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UNITED STATES PATENT OFFICE.

ALBERT P. BROOMELL, OF YORK, PENNSYLVANIA.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 307,265, dated October 28, 1884.

Application filed August 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALBERT P. BROOMELL, a citizen of the United States, residing at York, in the county of York and State of Pennsylvania, have invented certain new and useful Improvements in Traction-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements in traction-engines, and has for its object to provide better and more effective means for guiding than has heretofore been employed, the guiding of my engine being accomplished by its own power and requiring the performance of no manual labor on the part of the engineer. It has for a further object to provide a strong changeable gearing, whereby a fast or slow motion can be attained, as desired. Most traction-engines have heretofore been guided by turning the front-wheels, and when used for heavy hauling or plowing, as with gang-plows, the action of the engine has a tendency to lift the forward portion, leaving little weight on the front wheels, and often raising them from the ground; and when the front wheels are turned for the purpose of guiding there is not sufficient weight to make them take hold of the ground and turn the engine, and it frequently happens that the front wheels will turn at quite an angle without affecting the course. The harder the work to be done the greater this tendency to lift the forward wheels. This trouble is particularly noticeable in engines used for plowing. If one of the outside plows of a gang happens to strike an obstruction, it will often pull the engine out of its course.

These difficulties are all overcome by my improvements, which consist, essentially, in guiding the engine entirely by the driving-wheels, suitable gearing being used whereby the driving-wheels can be rotated both together or separately. When rotated separately, the still wheel acts as a pivot around which the engine is turned. The engine can thus be turned end for end within its own length. The wheels always have sufficient weight upon them to insure their taking hold of the ground, no matter how hard the work to be done, and the engineer performs no manual labor other than to move suitable levers, which throw either wheel in or out of gear, the space, time, and labor required in turning being reduced to the minimum. The changeable gearing for regulating speed also consists, essentially, of a pinion within a pinion, and an intermediate pinion, all connected with the operative mechanism, and means for throwing the intermediate pinion in and out of gear, whereby a fast or slow motion is available, as desired.

The particular construction and arrangement of the various parts I will now to proceed to point out and describe, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of an engine embodying my improvements. Fig. 2 is a vertical cross-section taken on line *x x*, Fig. 1. Figs. 3 and 4 are details showing the arrangement of the changeable gear.

Referring to said drawings, A represents the boiler and forward end of the engine, B the fire-box and rear portion of the engine.

C is a single caster-wheel supporting the forward end of the engine, and adapted to turn freely in any direction.

D is the crank-shaft, and D′ the fly-wheel, said crank-shaft and the driving-engine being of any approved construction, preferably as shown in the drawings.

E is the main axle; F, a driving-wheel keyed to the axle E, and F′ a driving-wheel mounted loosely on said axle.

G is a gear-wheel keyed to the axle E, and G′ a gear-wheel keyed to the hub of the loose wheel F′.

H H′ are pinions mounted loosely on the counter-shaft I, which is located above and parallel to the main axle. Said counter-shaft I is connected with the crank-shaft by suitable train of gearing, hereinafter described, and is rotated by said gearing. The pinions H H′ mesh with the gear-wheels G G′, and are provided with suitable lugs, *h h′*, which engage with corresponding grooves or lugs on the clutches or hubs K K′, which are mounted on and keyed to the shaft I and revolve with said shaft but are permitted a sufficient lateral movement to enable their lugs or grooves to engage with or clear the lugs *h h′* on the pinions H H′ as said clutches are moved to or from the pinions.

L L′ are levers for moving the clutches in or out of gear with the pinions H H′, and are locked in gear by suitable springs. These hubs or clutches may be made with suitable lugs and grooves, as described, or may be cone-shaped and act by friction. When the clutches engage with the pinions H H′, said pinions revolve with the shaft I, and motion is transmitted to the driving-wheels.

It will now be readily seen that when both levers L L′ are moved toward the pinions H H′ the hubs or clutches K K′ will engage with said pinions H H′. The shaft I now being revolved, said pinions will revolve with it and impart motion to the gear-wheels G G′, thus rotating both driving-wheels in the same direction and at the same time. The engine will then run forward in a direct line. When it is desired to turn the engine, one of the clutches is released from contact with one of the pinions, and only one driving-wheel will rotate, the other remaining still and acting as a pivot around which the engine turns, the single caster-wheel supporting its forward end allowing it to turn easily and quickly. The only labor the engineer performs is to move the levers, and by holding one lever open long enough for the engine to take a proper course and then letting it go the springs will cause the clutches to act on the pinions, both wheels will be driven, and the engine will go ahead in a direct line. By unlocking both clutches from the pinions the power will be entirely detached from the driving-wheels, and the engine will run without propelling the machine. The same general result could be accomplished by putting clutches on the main driving-axle instead of the counter-shaft, or by placing the gear-wheels G G′ and pinions H H′ one on each side of the boiler.

Referring now to that part of my invention which relates to the changeable gear for regulating the speed of the engine, the crank-shaft D, heretofore referred to, is mounted in suitable bearings, *a*. Surrounding said shaft, on the outside of the bearing *a*, is a sleeve, *b*, said sleeve being keyed to the shaft D. On the outer end of the sleeve is mounted the fly-wheel D′, the inner end of said sleeve being provided with teeth forming the pinion *c*, the outer circumference of the teeth of the pinion *c* being flush with the periphery of the sleeve *b*.

d is a pinion bored out perfectly round and fitting nicely over the pinion *c*, but loose enough to be slipped endwise on the sleeve *b*. Said pinion is moved back and forward by any suitable levers or other desired means, and is provided with lugs *e*, which enter corresponding grooves *e′* in the sleeve *b*, and is thus caused to rotate with said sleeve. Said pinion *d* is also provided with twice as many teeth as the pinion *c*, but of the same size and pitch.

f is a spur-wheel mounted on the counter-shaft I, and meshes with the pinion *d*, thus imparting motion to the shaft I and through the gearing to the driving-wheels.

g g are movable arms on each side of the spur-wheel *f*, and mounted on the shaft I.

h is a pin connecting said arms.

i is a pinion, mounted on the pin *h*, and is of the same size, and has the same number of teeth as the pinion *d*. Said pinion *i* also meshes with the spur-wheel *f*, and also with the pinion *c* when in the position shown in dotted lines Fig. 3.

When it is desired to run the engine at full speed, the pinion *d* is moved to the position shown in Fig. 3 over the pinion *c*, and meshes with the spur-wheel *f*, the pinion *i* being in the position shown in Fig. 3 and revolving free.

To reduce the speed of the engine, the pinion *d* is slipped out on the sleeve *b* to the position shown in dotted lines Fig. 4. The arms *g g* are then moved to the position shown in dotted lines Fig. 3 until the pinion *i* engages with the pinion *c*, and thus imparts a slower motion to the spur-wheel *f*. The arms *g g* are held in the desired position by any suitable means—such as a spring-bolt or other device. By this construction I secure a strong and effective gearing, by means of which the engine can be run at a high rate of speed when traveling on good roads, and can readily and quickly reduce the speed and increase power when necessary in performing hard work. This feature of my invention is a great advantage over the means for changing speed heretofore used, it being very strong, certain of action, and so simple in construction that it is almost impossible for the gearing to get out of order.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a traction-engine, a main axle, two main driving-wheels, one keyed to the axle, the other mounted loosely on the same, a gear-wheel keyed to the axle, and a gear-wheel keyed to the hub of the loose wheel, a counter-shaft connected by suitable gearing with the driving-engine, pinions mounted loosely on the counter-shaft and meshing with the gear-wheels, and suitable clutches for throwing said pinions in and out of gear with the counter-shaft, all arranged and operating substantially as and for the purpose shown and described.

2. In a traction-engine, the driving-wheel F, keyed to the axle E, and the driving-wheel F′, mounted loosely on said axle, the gear-wheel G, keyed to the axle E, and gear-wheel G′, keyed to the hub of the loose wheel F′, in combination with the counter-shaft I, connected by suitable gearing with the driving-engine, the pinions H H′, mounted loosely on said shaft I, and meshing with the gear-wheels G G′, and clutches K K′, for throwing said pinions in and out of gear with the shaft I, substantially as shown and described, as and for the purpose set forth.

3. In a traction-engine, the caster-wheel C,

the driving-wheel F, keyed to the axle E, and the driving-wheel F′, mounted loosely on said axle, the gear-wheel G, keyed to the axle E, and gear-wheel G′, keyed to the hub of the loose wheel F′, in combination with the counter-shaft I, connected by suitable gearing with the driving-engine, the pinions H H′, mounted loosely on said shaft I, and meshing with the gear-wheels G G′, and clutches for throwing said pinions in and out of gear with the shaft I, substantially as set forth.

4. In a traction-engine, the driving-wheel F, keyed to the axle E, and the driving-wheel F′, mounted loosely on said axle, the gear-wheel G, keyed to the axle E, and gear-wheel G′, keyed to the hub of the loose wheel F′, in combination with the counter-shaft I, the spur-wheel *f*, pinion *d*, sleeve *b*, and crank-shaft D, and the pinions H H′, mounted loosely on the shaft I, meshing with the gear-wheels G G′, and clutches K K′, for throwing said pinions in and out of gear with the shaft I, substantially as shown and described.

5. In a traction-engine, the driving-wheel F, keyed to the axle E, and the driving-wheel F′, mounted loosely on said axle, the gear-wheel G, keyed to the axle E, and gear-wheel G′, keyed to the hub of the loose wheel F′, in combination with the counter-shaft I, the spur-wheel *f*, pinion *d*, sliding on sleeve *b*, the pinion *c*, crank-shaft D, arms *g g*, pinion *i*, and pinions H H′, mounted loosely on the shaft I and meshing with the gear-wheels G G′, and clutches K K′, for throwing said pinions H H′ in and out of gear with the shaft I, all arranged and operating substantially as shown and described.

6. In a traction-engine, a crank-shaft surrounded at one end by a sleeve, being provided with a pinion on one end and key-seats, a laterally-movable pinion surrounding said sleeve and provided with suitable lugs for engaging with the key-seats in the sleeve, in combination with a spur-wheel mounted on a suitable shaft connected by gearing with the driving-wheels, and suitable arms holding an intermediate pinion adapted to mesh with the spur-wheel and pinion formed on the end of the sleeve, all arranged and operating to the end that a fast or slow motion may be imparted to the engine.

7. In a traction-engine, the crank-shaft D, sleeve *b*, surrounding said shaft, and provided with a pinion, *c*, in one end, and longitudinal key-seats, and the pinion *d*, mounted upon and sliding over the sleeve *b* and pinion *c*, and provided with lugs which engage with the key-seats in said sleeve *b*, in combination with the spur-wheel *f*, mounted on the shaft I, and the arms *g g*, carrying the pinion *i*, adapted to mesh with the spur-wheel *f* and pinion *c*, all arranged and operating substantially as shown and described.

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

ALBERT P. BROOMELL.

Witnesses:
GEORGE W. DICK,
E. J. SANKS.