(No Model.)

3 Sheets—Sheet 1.

H. B. McMURRAY.

TRACTION ENGINE.

No. 455,240. Patented June 30, 1891.

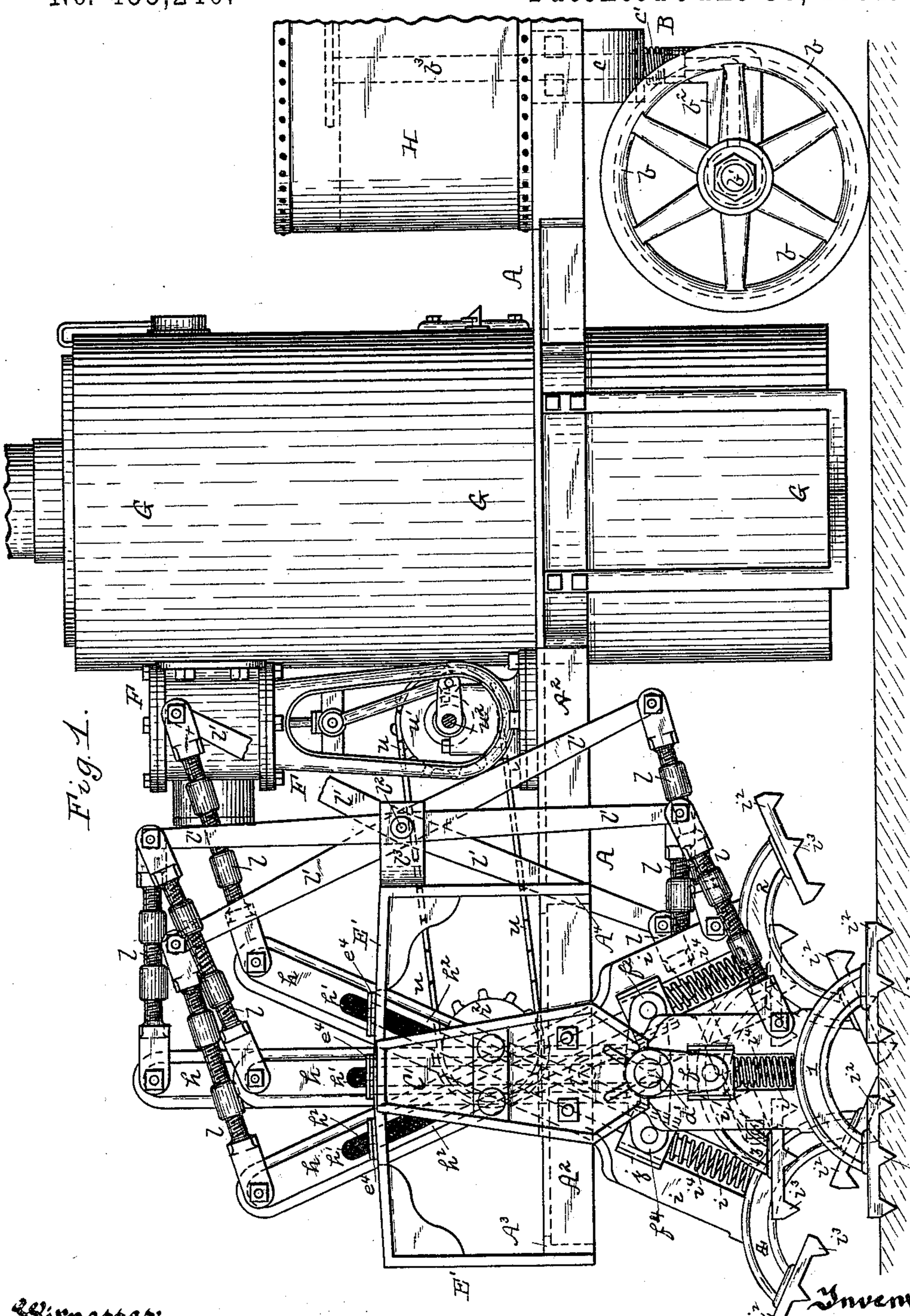

Fig. 1.

Witnesses:

J. N. Cootes.

Robt. D. Tolliver

Inventors

Henry B. McMurray

By James J. Katz

Attorney

(No Model.) 3 Sheets—Sheet 2.

H. B. McMURRAY.

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Fig. 6.

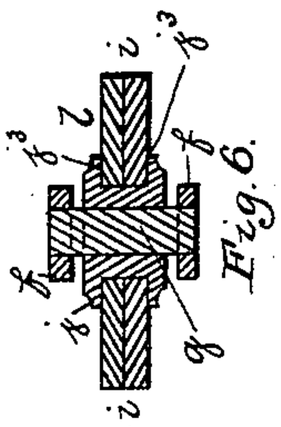


Fig. 7.

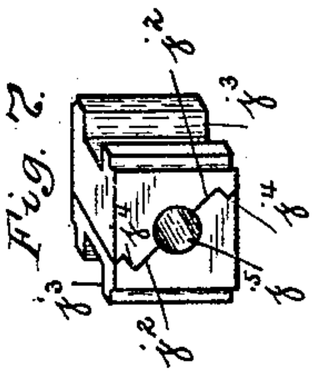
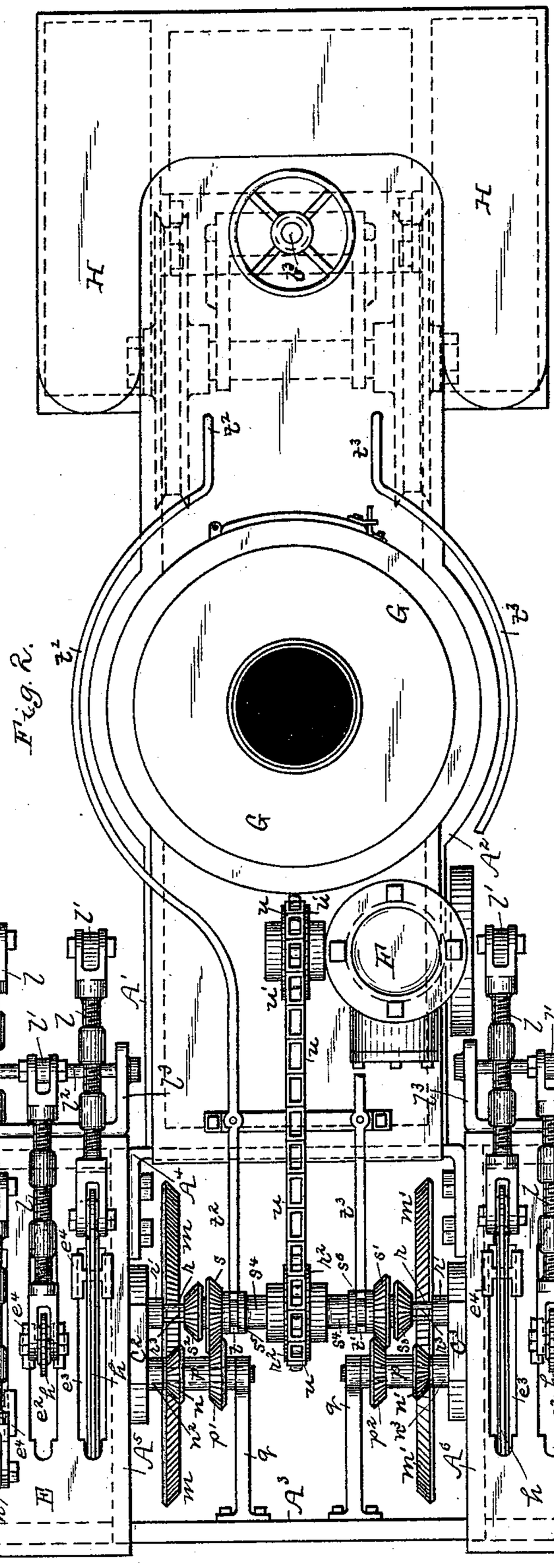


Fig. 2.



Witnesses:
J. McKenney.
Robt. B. Lotten

Inventor:
Henry B. McMurray
By James & Addy
Attorneys

(No Model.)

3 Sheets—Sheet 3.

H. B. McMURRAY.

TRACTION ENGINE.

No. 455,240. Patented June 30, 1891.

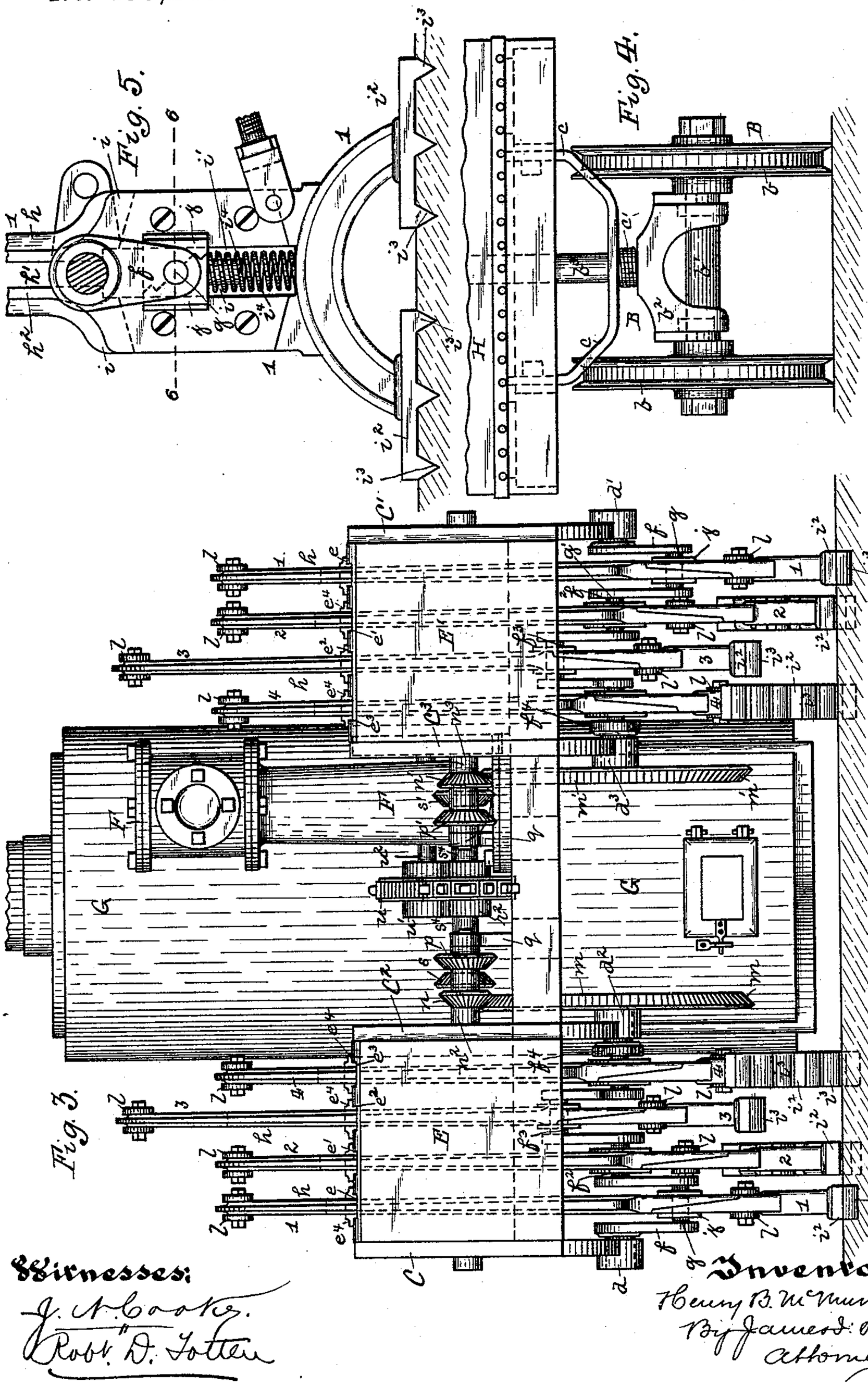


Fig. 3.

Fig. 4.

Fig. 5.

Witnesses:
J. A. Cooke.
Robt. D. Totten

Inventor:
Henry B. McMurray
By James A. Ray
Attorney.

UNITED STATES PATENT OFFICE.

HENRY B. McMURRAY, OF BURGETTSTOWN, PENNSYLVANIA.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 455,240, dated June 30, 1891.

Application filed December 4, 1890. Serial No. 373,579. (No model.)

To all whom it may concern:

Be it known that I, HENRY B. McMURRAY, a resident of Burgettstown, in the county of Washington and State of Pennsylvania, have invented a new and useful Improvement in Traction-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to traction power to be employed for the purpose of drawing cars, wagons, or agricultural implements, and has for its object certain improvements over the traction-engine described and illustrated in Letters Patent No. 318,194, granted to me May 19, 1885. In that patent is described a suitable carriage or frame supported at the front end on truck and wheels and having at the rear a power-shaft carrying a series of cranks journaled in legs or bars which support the rear end of the frame, and upon the rotation of the power-shaft said legs were caused to engage with the mechanism therein described and were advanced and lowered and again raised in turn to provide for the movement of the machine. The upper ends of the legs were provided with longitudinal slots, through which a horizontal guide-shaft passed, said slots allowing for the upward and downward movement of the legs, said legs being provided with cushioning-springs to free them from the jar occasioned by the feet striking the ground when the leg is lowered. This form of construction is accompanied with certain defects and points of weakness, which have been brought out by practical operation, and it is the object of my invention to overcome these difficulties and to improve the construction of the engine in certain other particulars, as will be more fully hereinafter set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view of the traction-engine. Fig. 2 is a plan view. Fig. 3 is a rear view. Fig. 4 is a front view showing the caster-wheels. Fig. 5 is an enlarged side view of part of one of the legs removed. Fig. 6 is a cross-section on the line 6 6, Fig. 5, showing the journal-boxes; and Fig. 7 is a perspective view of one of the journal-boxes removed.

Like letters indicate like parts.

The body A of the traction-engine is preferably made of iron beams to obtain the desired strength. At the forward end is the guide-truck B, which may be of any suitable construction; but for the purposes of my present invention I prefer to employ the caster-wheels b, mounted on the axis b', and secured to said axis b' is the bracket b^2, having the vertical shaft b^3. This enables the caster-wheels b to rotate on their axis b', according to the direction of the propulsion of the carriage or other vehicle to which it is attached, thus enabling them to be steered and turned around in a very small area. The forward part of the frame A is provided with the cross-piece c, through which the vertical shaft b^3 passes, a spring c' being interposed between the cross-piece c and the bracket b^2 to provide for any jar which may be imparted to the forward end of the frame B. At the rear of the body A is the rear supporting-frame, composed of the longitudinal beams A' A^2, the cross-beam A^3, and the cross-beam A^4. The rear frame is further provided with the inner longitudinal beams A^5 A^6, parallel with the outer longitudinal beams A' A^2. These several beams constitute what will be termed the "rear portion" or "body" of the engine. Secured to the outer longitudinal beams A' A^2 are the journal-brackets C C', having the journals d d' respectively journaled therein in suitable bearings, said journals being situated below the longitudinal beams A' A^2 of the rear body of the machine. To the inner longitudinal beams A^5 A^6 are also secured the journal-brackets C^2 C^3, which are also provided with the journals d^2 d^3, respectively. On both sides of the rear body of the machine are what will be hereinafter termed the "lever-guides" E E'. These lever-guides E E' are elevated above the rear body of the machine, being secured to the cross-beams A^3 A^4, the said lever-guides E E' being provided with the longitudinal slots e e' e^2 e^3. Mounted in the journals d d' are the crank-arms f, the other ends of said crank-arms f being journaled in the boxes j, sliding in suitable guideways in the lower part of the legs 1, said boxes being adapted to move vertically in guideways in said legs, as will more fully hereinafter appear.

The legs which support the rear body of the machine and by which the machine is propelled have the peculiar construction shown in Fig. 5. These legs may be increased to any desired number; but for the purposes of simplicity of illustration I have confined the description to an engine having four legs on each side thereof. These legs I will designate by the numerals 1 2 3 4, and they consist of the upper vertical portion h, having the slot h' formed therein and a guideway h^2 formed within said slot. The lower portion of the leg is enlarged, as at i, and within said enlarged portion i is formed the vertical slot or guideway i', while feet i^2 are formed on said large portion i, said feet being provided with suitable engaging cleats or spikes i^3 to give a hold upon the ground.

As stated, the crank-arms f have their journals g mounted in the journal boxes or blocks j, said blocks having guide-faces thereon and adapted to travel vertically within the slot i, formed in the enlarged portion i of the legs, a spring i^4 being interposed between the bottom of said slot i' and the journal-block j to relieve any jar that may be imparted to the leg in being lowered into contact with the ground. These journal-blocks j are constructed in two parts, as shown in Fig. 6, said parts having the angular faces j^2, diagonal to the slot i', said faces having the shoulders j^4 and the guide-faces j^3, and when said journal-blocks j are in position within the slot i' the guide-faces j^3 engage with said slot and the angular faces j^2 are in contact with each other, being held face to face by the guide-faces j^3. This construction allows for a slight amount of play for the parts of said journal-block when raised or lowered within the slot i', which decreases the friction and jar imparted to the machine in the lowering of the legs. The journal-blocks j have the central bearings j^5, through which the journals g pass.

Having now described the construction of one of the legs, the same description applies to all, and I will now describe the manner in which the several legs are operated by the several cranks. Secured to the inner ends of the journals g are the crank-arms f^2, the other end of said crank-arms being secured to a journal g', corresponding to the journals g in the leg 1, the remaining points of construction of the leg 2 being similar to that of the leg 1. In like manner the remaining legs 3 and 4 are connected by cranks f^3 f^4, respectively, similar to the cranks hereinbefore described, the inner leg 4 being secured by a crank f^4, similar to the crank f, employed to secure the leg 1 to the journal d in the outer journal-brackets C C', the inner journal-brackets C^2 C^3 being also provided with the journals d^2 d^3, and to these are secured the said crank f^4 of the inner leg 4. The vertical portions h of the legs 1 2 3 4 pass up through the slots e e' e^2 e^3 in the lever-guides E, and within said slots e e' e^2 e^3 are the sliding bearings e^4, adapted to travel to and fro in said slots, the vertical slots h^2 engaging with the sliding bearings e^4, so that upon the movement of said legs, as hereinafter set forth, the said sliding bearings e^4 guide the legs to and fro in the slots e e' e^2 e^3. Levers l are pivoted to the upper and lower ends of said legs 1 2 3 4, the forward end of said levers l being pivoted to rocking levers l', said rocking levers being journaled at their mid-point upon a shaft l^2, secured to an extension l^3 of the lever guide-frame, providing for a rocking motion in said levers. Journaled on the journals d^2 d^3 of the journal-brackets C^2 C^3, respectively, are the bevel gear-wheels m m', said gear-wheels m m' meshing with bevel-pinions n n', said pinions n n' being journaled in bearings n^2 n^3, formed on the journal-supports C^2 C^3. The pinions n n' are cast integral with the journal p, and integral therewith are also formed the pinions p' p^2, the journal p carrying the said pinions n n' and p' p^2, and being journaled, as stated, at one end in the bearings n^2 n^3 and journaled on their inner ends in bearings formed in the arms q, supported by the rear cross-beams A^3.

Directly in front of the journals p is the horizontal shaft r, journaled in bearings r', formed in the journal-supports C^2 C^3, said shaft having secured thereto at the mid-point thereof the sprocket-wheel r^2. On both sides of the sprocket-wheel r^2 and secured to the shaft r are the bevel-pinions s s', said pinions being cast integral with the sleeve s^4, adapted to rotate with said shaft r, but being adapted to slide to and fro on said shaft through the feathers r^3 on said shaft engaging with corresponding grooves within said sleeve s^4. Cast integral with the sleeve s^4 are also the pinions s^2 s^3, adapted to be thrown into engagement with the large bevel gear-wheels m m', as will more fully appear. Forked arms t t' engage with grooves s^5 s^6 on the sleeve s^4, said forked arms being secured to levers t^2 t^3, extending toward the forward end of the frame A, said levers being pivoted to the frame and adapted to be thrown back and forth to slide the pinions on the sleeve s^4 upon the horizontal shaft r, so that when the pinions s s' mesh with the pinions p' p^2 by throwing the levers in the proper direction one of the pinions, such as s^2, may be thrown into engagement with the gear-wheel m, or the pinion s^3 may be thrown into engagement with the gear-wheel m', either separately or together, for the purpose hereinafter more fully set forth. Any other form of gearing mechanism may be employed which will produce a like result. A driving-chain u passes around the sprocket-wheel r^2, and thence to the sprocket-wheel u' on the driving-shaft u^2 of the engine.

The engines F are supported on the frame A in any suitable manner in a vertical position, and their pitmen are secured in the usual manner to the cranks of the engine-shaft u^2, upon which is mounted the sprocket-wheel u',

so that the power from the engine is transmitted directly from the engine-shaft to the sprocket-wheel u' and by the driving-chain u to the sprocket-wheel r^2.

The boiler G is supported upon the forward frame A in front of the engine, and in front of said boiler is the tender H for carrying the coal and water supply, the boiler, engines, and tender being so located that the weight is evenly distributed, so providing for the ready locomotion of the engine.

The operation of my improved traction-engine is as follows: The power from the engine is transmitted through the sprocket-wheel u', driving-chain u, and sprocket-wheel r^2 directly to the horizontal shaft r. Where it is desired to drive the machine forward in a direct line the pinions s s' will be in engagement with the pinions p' p^2, and when power has been transmitted to drive said pinions s s' the pinions p' p^2 will be driven in the opposite direction; but, since the pinions p' p^2 are cast in the journal p and integral therewith are also the pinions n n', the said pinions n n', meshing with the gear-wheels m m', will drive said gear-wheels m m' in the opposite direction, or in the same direction as the pinions s s'. Upon the rotation of the gear-wheels m m' a like motion is transmitted through them to the journals d^4 d^5 on the journal-brackets C^2 C^3. Since the crank f^4 of the inner leg 4 is secured to the journals d^4 d^5, the rotation imparted to said journals will cause the said crank f^4 to move in a certain fixed radius, the other end of said crank being secured to the leg 4 through the bearing-blocks j, adapted to move up and down within the slots i' of the enlarged portion i of said leg. This movement of the crank f^4 imparts to the legs 4, first, an upward movement, raising said legs from the ground, and, second, carrying said legs forward until the crank-arm descends and carries down the leg 4 again into contact with the ground, the upward movement of the leg being provided for by the slots h^2, moving up and down on the sliding bearings e^4, and the slot e^3, providing for the forward movement of the leg, the guide-piece e^4 moving back and forth in the guideway formed for it by said slot. The levers l above and below and the rocking levers l' provide for this forward and backward movement of the legs, the said rocking levers l' rocking back and forth on the journal l^2, thereby regulating the motion of said legs and keeping them in proper alignment with each other.

From the construction described and the arrangement of the legs 1 2 3 4 it will be found that when the machine is raised or in motion three feet on each side of the machine will be in contact with the ground, so affording sufficient support at all times for the weight incumbent upon them.

In describing the operation of the leg 4 I have simply shown its operation as distinct from the operation of the remaining legs. It must be borne in mind that as soon as the legs 4 begin to move a movement is also imparted to the several other legs, in order that by the time the legs 4 have been raised with their feet from the ground the leg 1, with its two feet and one foot of leg 2, will be in contact with the ground. This is due to the arrangement of the several cranks, so that, as stated, upon the rotation of the crank of the leg 4 through the connection of the several crank-arms between said leg and leg 1 the crank f, through the motion imparted to it, will lower and at the same time drive forward the legs 1 until they come in contact with the ground, the leg 4 having been raised therefrom. In this position the two feet of legs 1 are in contact with the ground and the one foot of leg 2. Upon a further revolution of the gear-wheels m m' the leg 1, together with its feet, is raised from the ground, while the forward foot of leg 2, before raised from the ground, is now lowered into contact therewith, thus bringing both feet of leg 2 into contact with the ground and the rear foot of leg 3, the leg 4 having meanwhile advanced forward; again, upon further rotation, the feet of leg 2 are raised from the ground, or at least the rear foot thereof is raised from the ground; but the fore foot thereof remains in contact with the ground until both feet of leg 3 have been brought into contact with the ground and the rear foot of leg 4, which having advanced to its farthest position is lowered by the operation of the crank-shaft and the bearing-block j moving down in the slot i' of the enlarged portion i of said leg. It will be observed that this lowering of the bearing-blocks within the slots i' occurs upon the lowering of each of the legs, the springs j' relieving practically all the jar which is necessarily imparted to the leg upon being lowered.

If the machine has been traveling forward and it is desired to back it or reverse its motion, it is only necessary to throw forward the levers t^2 t^3, which, through the forked arms t t', engaging with the grooves s^5 s^6, thereby throws the pinions s s' out of engagement with the pinions p' p^2, and at the same time throwing the pinions s^2 s^3 directly into engagement with the large gear-wheels m m', thus imparting the reverse motion to said gear-wheels from that before imparted to them by the pinions n n'. It is obvious that upon this reverse motion of the gear-wheels m m' there will be a like reverse motion imparted to the several cranks and journals connecting the legs 1 2 3 4, so that instead of said legs advancing and transmitting a forward movement to the engine they will move backward and draw the engine in that direction. In this manner I am enabled to provide for the reversal of the engine without reversing the engines proper F, which furnish the power to drive the traction engine. In case it is simply desired to turn the traction-engine, only one of the pinions s s' is thrown out of engagement with the pinions p' p^2 and one of the pinions s^2 s^3 thrown into engage-

ment with the large gear-wheels m m', upon which operation one set of legs will have a forward movement and the other set of legs a backward movement. The legs to which the backward movement is to be imparted and those to which the forward movement is to be imparted is of course regulated by the direction in which it is desired to turn the traction-engine. If the engine is to be turned to the left, the pinion s' is thrown out of engagement with the gear-wheel m', the pinion s remaining in engagement with the pinion p', while at the same time the pinion s^2 is thrown into engagement with the gear-wheel m. Power is then exerted to drive the set of legs on the right of the machine forward and those on the left backward. It is obvious that this movement will swing the front end of the engine to the left, and it is at such a stage of the operation of my improved traction-engine that the caster-wheels b disclose the advantages obtained by the employment of them, for as these caster-wheels rotate on their axis b they will drive the engine according to the direction of the propulsion of the said engine or other vehicle to which it is attached, and after the motion, as described, of advancing the legs on the right hand and of withdrawing those on the left the said caster-wheels will conform to the direction of propulsion, swinging around on the vertical shaft b^3, automatically heading the wheels in the direction that it is desired to turn the engine.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In traction-engines, the combination, with a body or frame, of a crank-shaft, a supporting-leg journaled on said crank-shaft, and a rocking shaft pivoted to the frame on the same longitudinal plane as the crank-shaft and connected to the upper and lower ends of said supporting-leg, substantially as and for the purposes set forth.

2. In traction-engines, the combination of a supporting-frame having a crank-shaft mounted in said frame and having a longitudinal guideway above said crank-shaft, a supporting-leg journaled in the crank of said shaft and extending up through said guideway, a rocking shaft pivoted in the same longitudinal plane as the supporting-leg, and connections therefrom to the upper and lower ends of said supporting-leg, substantially as and for the purposes set forth.

3. In traction-engines, the combination of a supporting-frame having a crank-shaft mounted in said frame and having a longitudinal guideway above said crank-shaft, a supporting-leg journaled in the crank of said shaft and extending up through said guideway, a rocking shaft pivoted in the same longitudinal plane as the supporting-leg, and connections therefrom to the upper and lower ends of said supporting-leg, said supporting-leg having a longitudinal slot in the upper portion thereof, and a sliding bearing fitting within the guideway of the supporting-frame, substantially as and for the purposes set forth.

4. In a traction-engine, the combination of a body or frame having a crank-shaft provided with a series of cranks mounted thereon, a series of supporting-legs journaled on said cranks of said crank-shaft and held thereby at an angle the one to the other, a series of rocking shafts mounted in the same longitudinal plane, respectively, of the supporting-legs, and connections from said rocking shafts with the upper and lower ends of said legs, substantially as and for the purposes set forth.

5. In a traction-engine, the combination of a supporting-frame having two independent crank-shafts mounted thereon and a series of supporting-legs journaled on said crank-shafts, a power-shaft driven from the engine, and gear connections from each such crank-shaft to said power-shaft, said gear connections having reversing mechanism, substantially as and for the purposes set forth.

6. In traction-engines, the combination of the supporting-frame having a series of independent crank-shafts mounted thereon and having a series of supporting-legs journaled on said crank-shafts, the gear-wheels m m', mounted on crank-shafts d^2 d^3, respectively, the shafts p, carrying the gear-wheels n n' and p' p^2, and the power-shaft r, having the reversing-sleeves provided with pinions adapted to gear with the gear-wheels m m' on the crank-shafts or with the gear-wheels p' p^2 on the intermediate shafts p, substantially as and for the purposes set forth.

7. In a traction-engine, the combination of a frame having a crank-shaft mounted therein, a supporting-leg having a longitudinal guideway formed therein, a box sliding in said guideway, within which the crank of the crank-shaft is journaled, and a spring confined between the lower end of said box and the base of said guideway, substantially as and for the purposes set forth.

8. In a traction-engine, the combination of a frame having a crank-shaft mounted therein, a supporting-leg having a longitudinal guideway formed therein, a box sliding in said guideway, within which the crank of the crank-shaft is journaled, and a spring confined between the lower end of said box and the base of said guideway, said bearing-box being divided into two parts diagonally of the guideway and being provided with engaging shoulders f^4, substantially as and for the purposes set forth.

In testimony whereof I, the said HENRY B. MCMURRAY, have hereunto set my hand.

HENRY B. MCMURRAY.

Witnesses:
J. D. FREDERICKS,
T. M. PATTERSON.