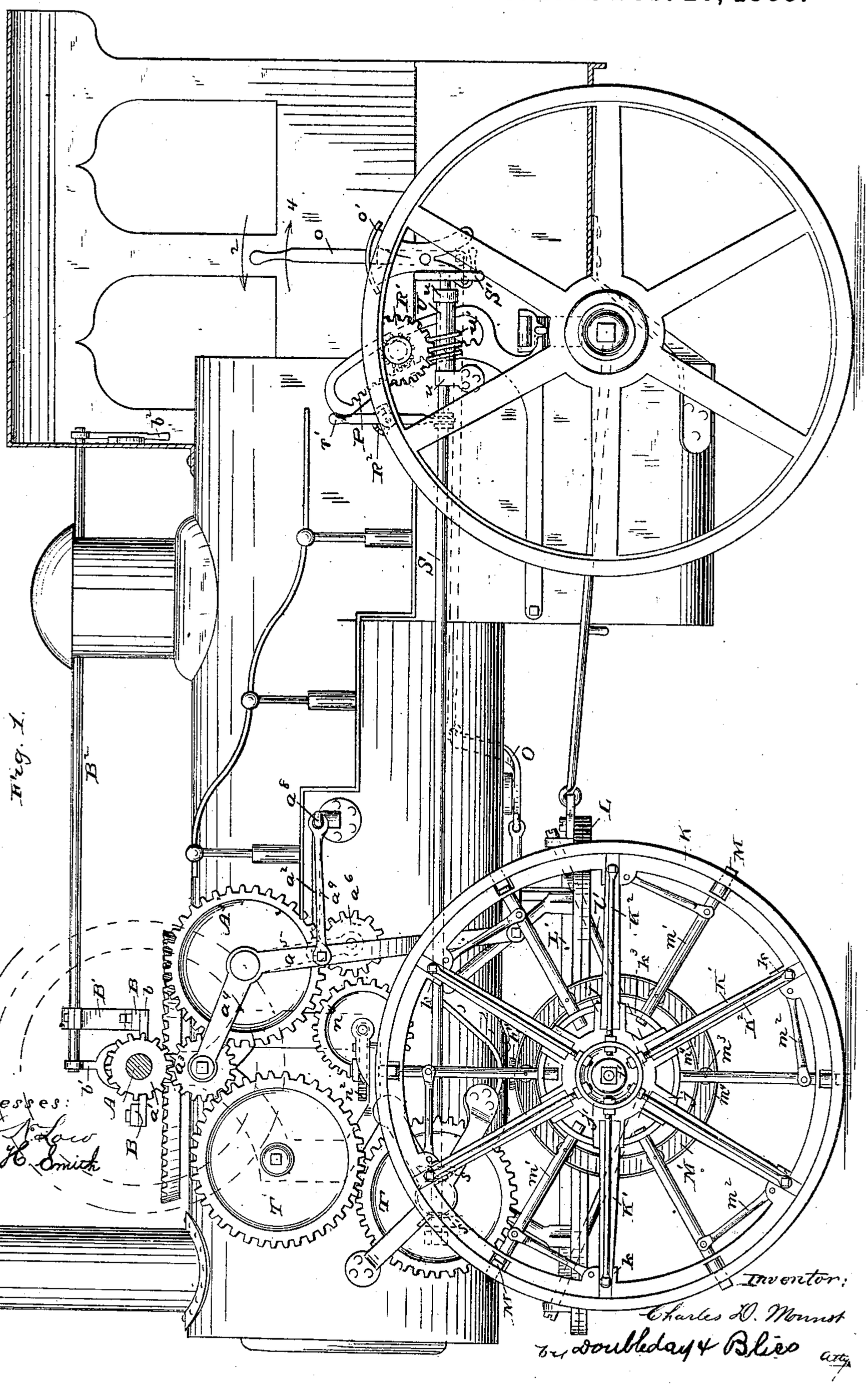
(No Model.)

4 Sheets—Sheet 1.

C. D. MONNOT.

TRACTION ENGINE.

No. 272,743. Patented Feb. 20, 1883.



Witnesses:
A. D. Lacy
A. H. Smith

Inventor:
Charles D. Monnot
by Doubleday & Bliss
Attys

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

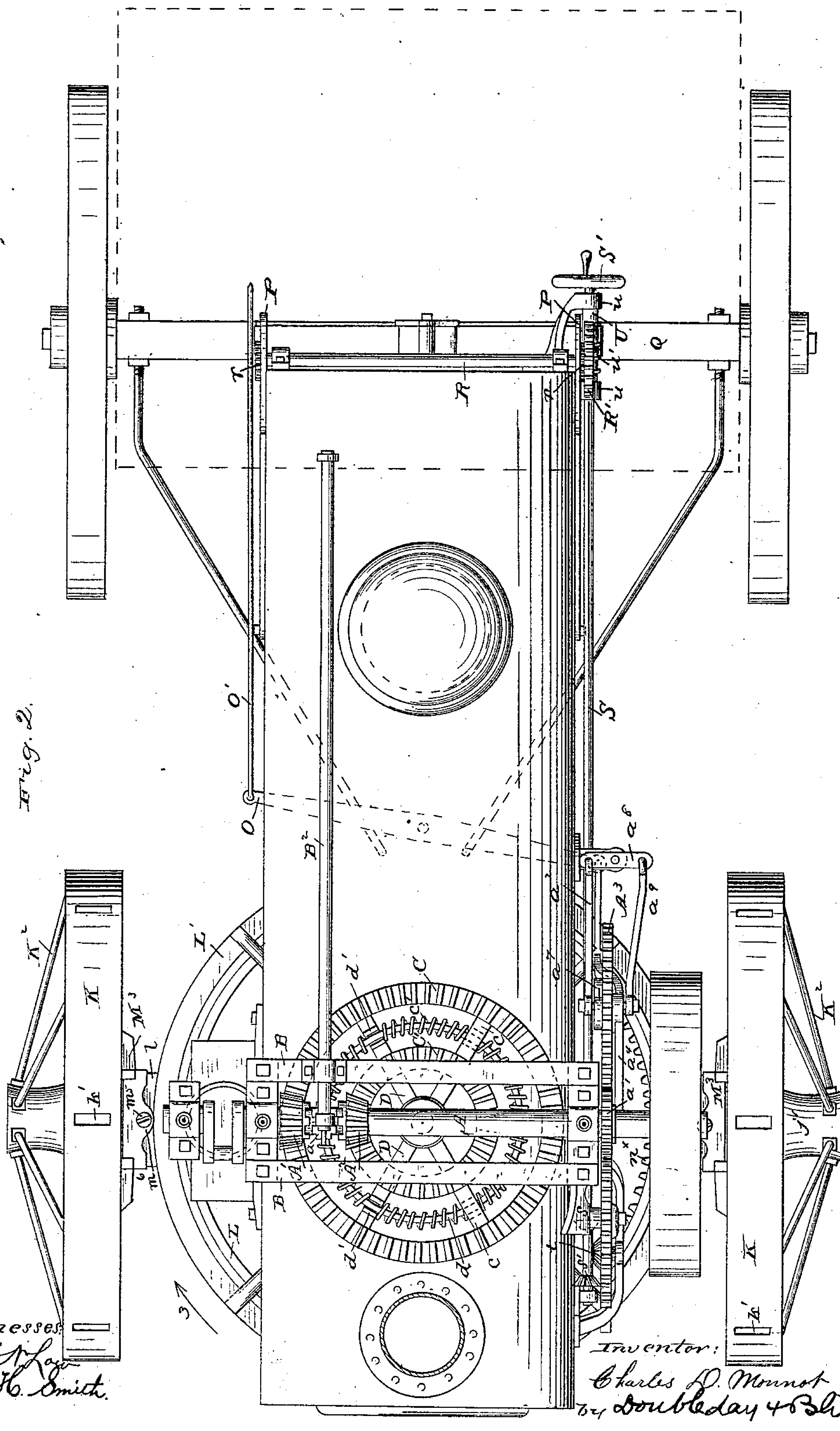
(No Model.) 4 Sheets—Sheet 2.

C. D. MONNOT.

TRACTION ENGINE.

No. 272,743. Patented Feb. 20, 1883.

Fig. 2.



Witnesses:
H. N. Low
N. H. Smith.

Inventor:
Charles D. Monnot
by Doubleday & Bliss atty.

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

(No Model.)

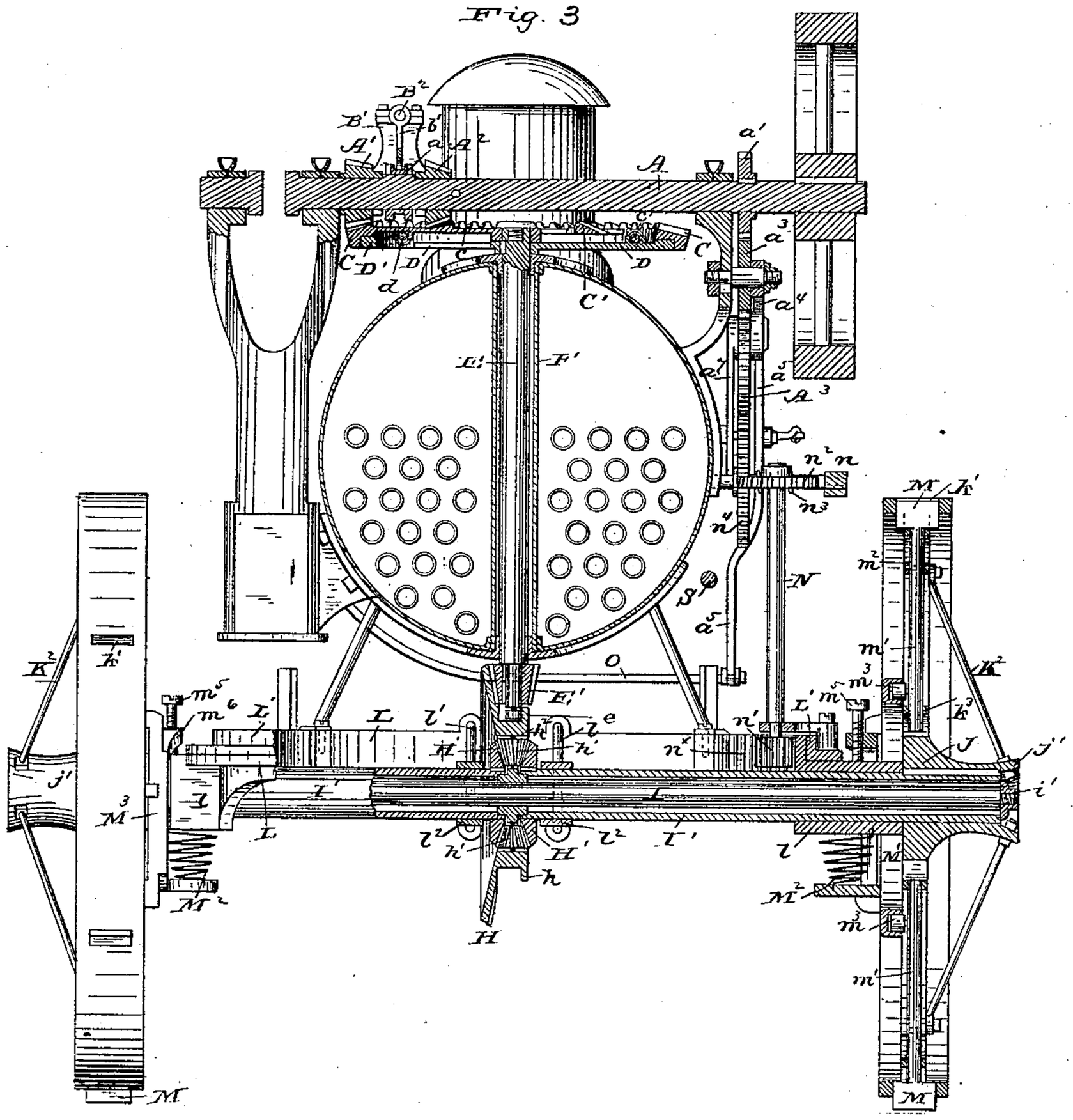
4 Sheets—Sheet 3.

C. D. MONNOT.

TRACTION ENGINE.

No. 272,743. Patented Feb. 20, 1883.

Fig. 3



Witnesses:

H. N. Low
N. H. Smith

Inventor:

Charles D. Monnot
by Doubleday & Bliss attys.

(No Model.)

4 Sheets—Sheet 4.

C. D. MONNOT.

TRACTION ENGINE.

No. 272,743. Patented Feb. 20, 1883.

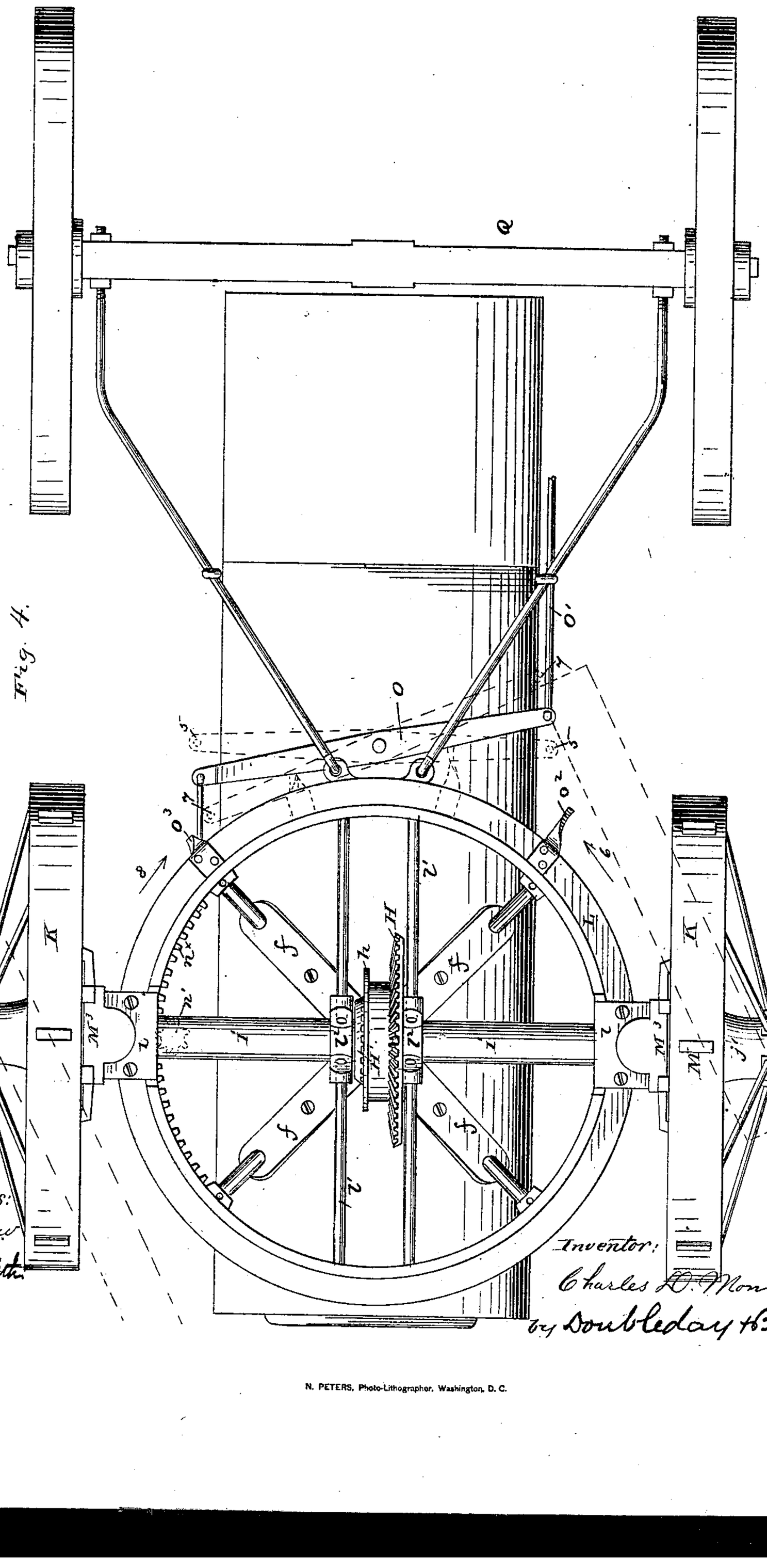


Fig. 4.

Witnesses:
A. N. Low
A. H. Smith

Inventor:
Charles D. Monnot
by Doubleday & Bliss Attys

UNITED STATES PATENT OFFICE.

CHARLES D. MONNOT, OF CANTON, OHIO.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 272,743, dated February 20, 1883.

Application filed October 4, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. MONNOT, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Traction-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a side elevation of my improved traction-engine. Fig. 2 is a top plan view. Fig. 3 is a vertical transverse section through the line of the front axle and the main vertical power-shaft. Fig. 4 is a bottom plan view.

In the drawings, A is the crank-shaft of the engine, mounted in suitable bearings provided with two bevel-gears, A′ A², mounted loosely upon the shaft and connected therewith alternately by means of a sliding clutch-piece, *a*, which is feathered to the crank-shaft.

B B are parallel rods, attached at their ends to the cap-plate *b* of the shaft-bearings.

B′ is a bracket supported upon the rods B B, and carrying a rock-shaft, B².

b′ is an arm projecting downwardly from the rock-shaft, its lower forked end taking into the clutch-piece *a*, and causing it to engage with the clutch-faces of one or the other of the bevel-gears A′ A², the rock-shaft being actuated by a rod, *b²*, which extends to within convenient reach of the engine-driver.

C C′ are bevel crown-wheels, the arms *c c* of which engage with coiled springs *c′ c′*, which are supported upon circular guiding-rods *d d*, which are seated in recesses *d′ d′*, provided for their reception in the arms D D of a power-wheel, D′, which is arranged immediately below the crown-wheel C C′, which latter is by preference rabbeted upon its under face to receive the rim of the power-wheel, as indicated in Fig. 3.

E is a power-shaft passing vertically through the boiler, and having the power-wheel D′ keyed to its upper end, an upward extension of the shaft serving by preference as a pivot for the bevel crown-wheel C C′.

F is a flue inserted in the boiler to receive the power-shaft E and prevent leakage at that point.

f f are spider-arms projecting from a bearing adapted to receive and support a bearing for the lower end of the power-shaft. These arms are united or otherwise secured to the boiler, there being a similar bearing for the upper end of said shaft.

E′ is a bevel-pinion keyed to lower end of power-shaft E.

e is an anti-friction wheel, mounted upon the lower end of power-shaft E and engaging with a flange, *h*, which projects from the hub of bevel-gear H, which, together with bevel-gears H′ H′ and pinions *h′ h′*, mounted upon stud-shafts *h² h²*, projecting inwardly from the hub of bevel-gear H, constitute a compensating-gear, through which power is transmitted from the bevel-pinion E′ on the power-shaft to the front axle, I I′ I′, the bevel-gears H′ H′ being keyed to the axle. This front axle is a compound one, consisting of an inner shaft, I, and two tubular portions or sleeves, I′ I′, to the inner end of which the bevel-gears H′ H′ are keyed, the driving-wheels being keyed firmly to the outer ends of the tubular parts I′ I′.

i′ i′ are nuts screwed upon the threaded outer ends of the inner member, I, of the axle; or, when preferred, the inner member of the axle may consist simply of a bolt having a head at one end and a nut at the other.

I will now describe in detail the construction and operation of the driving and steering wheels.

Each driving-wheel is constructed with a hub, J *j j′*, of which J is the hub proper, securely keyed to the outer end of one of the members I′ of the axle; *j j* are sockets for the spokes, and *j′* is an outwardly-projecting tubular extension or flange.

K is the tire or tread of the wheel, provided with socket *k* to receive the outer ends of the spokes, and also the series of slots *k′ k′*, through which claws protrude under certain circumstances, as will be explained.

K′ K′ are spokes, preferably of wrought-iron, secured in the sockets *j k*.

K² K² are truss rods or braces, the outer end of each of which is formed with an eye, and secured to the spokes by means of the same bolt which holds the spoke in the socket of the tire, the inner end of each truss-rod being threaded, and passing through the tubular ex-

tension j', where it is secured and its tension adjusted by means of two nuts, one upon either side of the tubular extension. The outer ends of the front axle are supported in bearings $l\,l$, formed with or attached to the lower member, L, of the fifth-wheel.

M M are the claws, mounted in slots k', and provided with shanks m' m', which at their inner ends pass through holes in the webs k^3, between the arms of the hub.

m^2 m^2 are links, each pivoted at one end to the tire of the wheel, and at its opposite end each is preferably forked to the shank near its outer end. Each shank is provided near its inner end with an inwardly-projecting spur, which carries an anti-friction wheel, m^3, arranged to traverse a groove formed between two flanges, m^4 m^4, of a guiding-wheel, the central part of which is provided with a rectangular opening or seat, M^3, by means of which the guiding-wheel M′ is supported upon a square or rectangular plate, cast upon the fifth-wheel in such manner that the guiding-wheel can rise and fall, and thereby be made concentric to the axle or eccentric thereto, to either of which positions it can be adjusted by means of a set-screw, m^5, working in a lug, m^6, upon the guide-wheel, and a spring, M^2, which rests upon a lug or stop, also cast upon the guiding-wheel, the upper end of the spring engaging with the lower face of the fifth-wheel. Thus it will be seen that when the parts are in the position shown in Fig. 3 the spring M^2 tends to thrust the guiding-wheel into a position eccentric to the driving-wheel and its axle, and consequently to thrust the claws downward through the tire and into the ground over which the engine is moving, and it will also be understood that the extreme limit to which these claws can be thrust through the tire by the action of the spring and guiding-wheel is determined by the set-screw, and that the distance which in practice the claws will enter the ground is determined by the hardness of the ground and the tension of the spring. It will also be seen by examining the same figure that when the engine is being propelled over the ground by means of its driving-wheels the links m^2 support the outer ends of the shanks and the claws against the pull of the engine, and thus prevent friction of the claws against the walls of their slots, leaving them free to move in and out through the slots, as the position of the guiding-wheel, the tension of the spring, and the hardness of the ground may necessitate, without any undue cramping of the parts. I propose to bevel the outer ends of these claws to facilitate their entering the ground, and, when preferred, they may be notched or otherwise shaped to enable them to readily take hold of the earth over which the engine is moving.

L′ is the upper member of the fifth-wheel, and may be connected with the engine by any suitable system of braces or otherwise, and both members of this wheel may be of any usual or preferred construction.

$l\,l$ are bearings for the inner ends of the members I′ I′ of the front axle, and are supported from the lower member of the fifth-wheel by means of girths l' l'.

N is a vertical shaft, supported at its lower end in a bearing projecting from the upper member, L, of the fifth-wheel and at its upper end in a bracket-bearing, n, attached to the shell of the boiler. This shaft carries at its lower end a pinion, n', which meshes with a cogged segment, $n^\times$, on the lower member of the fifth-wheel.

n^2 is a worm-wheel at the upper end of the shaft.

n^3 is a worm taking into worm-wheel n^2, and carrying a spur-gear, n^4, which may be driven alternately in opposite directions by the following mechanism:

a' is a spur-gear keyed to the crank-shaft.

a^2 is an idler, the supporting-shaft of which is mounted in a curved slot in the same standard which supports the bearing at that end of the crank-shaft.

a^4 a^5 is a bent lever, pivoted upon the shaft of the idler a^3.

A^3 is also an idler mounted upon the bent lever at its angle, and a^6 is another idler mounted upon the lower end of an arm, a^7, which is pivoted at the center of the idler A^3, and is thrust toward and from the spur-gear n^4 by means of link a^2, lever a^8, and a link, a^9, which connects one end of the lever a^8 with the bent lever a^4 a^5, the idler a^6 being always in mesh with the idler A^3.

O is a lever pivoted at the lower side of the boiler, and connected at one end to the lower end of bent lever a^4 a^5 and at its opposite end to a link, O′, which extends rearward, and is at its rear end connected to a shipping-lever, o, arranged within reach of the engine-driver.

o' is a notched rack, by means of which shipping-lever o may be held in any desired position.

From an examination of the drawings it will be readily understood that when the idler a^3 is in mesh with pinion a' both of the idlers A^3 and a^6 will be driven continuously, but in opposite directions, and that when the parts are in the position shown in Fig. 1 these idlers are withdrawn from mesh with spur-gear n^4; and it will also be seen that when the engine-shaft is driven in the direction indicated by arrow 1, and the shipping-lever be moved forward in the direction indicated by arrow 2 a sufficient distance, the idler A^3 will be caused to mesh with the spur-gear n^4, and that a continued revolution of the crank-shaft in the same direction will rotate the lower member of the fifth-wheel in the direction indicated by arrow 3; and it will also be seen that by moving the shipping-lever in the direction indicated by arrow 4 the idler A^3 will be withdrawn from spur-gear n^4, and idler a^6 will be made to engage with said spur-gear n^4, thus reversing the movement of the lower member of the fifth-wheel and the front axle. Thus the engine may be turned in any desired direction.

o^2 o^3 are upwardly-projecting arms, attached to and moving with the lower member of the fifth-wheel, their ends projecting far enough above the said wheel to engage with opposite ends of the lever O.

By examining Fig. 4 it will readily be understood that when the lever O is in the position indicated by dotted lines 5, and the lower member of the fifth-wheel and the axle are moving in the direction indicated by arrow 6, arm o^2 will, as the movement of the parts progresses, engage with said lever and move it into the position shown in full lines in said figure, and thereby withdraw the idler from contact with the spur-gear n^4, and thus check the swinging movement of the axle before the pinion will have reached one end of the cogged segment $n^\times$. So, also, if the lever O be placed in the position indicated by dotted lines 7, and the axle and lower member of fifth-wheel be moving in the direction indicated by arrow 8, the arm o^3 will engage with lever O and move it into the position indicated in full lines, thus breaking all connection between the driving-shaft and the worm-wheel before the pinion n' will have reached the opposite end of the cogged segment $n^\times$.

Referring particularly to Figs. 1 and 2, P P are cogged segmental racks, attached at their lower ends to the spring, which in turn is supported upon the rear axle, Q.

R is a shaft supported horizontally in bearings at the rear end of the boiler, and provided at each end with a spur-pinion, r, which engages with one of the racks P.

R′ is a worm-wheel on one end of shaft R.

S is a horizontal shaft, mounted in bearings projecting from the side of the boiler, and carrying at its forward end bevel-pinions s s', which are by a longitudinal movement of shaft S caused to engage alternately with a bevel-pinion, t, which is attached to spur-gear T, driven by idlers T′, meshing with idlers a^3, the curved slot in which the shaft of this idler a^3 is mounted being concentric with idler T′.

U is a sleeve supported so as to rotate in bearings u, which project from the boiler.

w' is a worm on sleeve U, and meshing with worm-wheel R′.

r' is a shipping lever connected to the rear end of shaft S.

R^2 is a notched rack, with which the shipping-lever r' engages.

By thrusting the shaft S forward the rear pinion, s, is caused to engage with bevel-pinion t, which is driven from the engine-shaft by the train of gearing above described, and a rotary motion is imparted to the worm w', and thence to the shaft R and pinions r, which will either raise or lower the rear of the boiler, according as the engine is running forward or backward. Of course by drawing the shaft S back until the bevel-pinion s' engages with bevel-pinion t a reverse movement is imparted to the worm, so that the rear end of the boiler may be either raised or lowered, whether the engine be running forward or backward. In order to provide for raising or lowering the rear end of the boiler when the engine is standing still, I have applied a crank-wheel, S′, to the shaft S. Of course when the hand-wheel is being used to rotate the shaft and worm the shipping-lever r' must be placed in such position that neither of the bevel pinions s s' shall mesh with bevel-pinion t. By mounting the toothed segments upon the axles, instead of upon the boiler, and then mounting the pinion-shaft upon the boiler, I avoid all upward and downward movement of the shaft relative to the end of the boiler, this being very desirable, as it avoids all possibility of the shaft traversing the space in front of the furnace-door, and thus interfering with opening said door as the end of the boiler is being raised and lowered.

I do not in this application claim anything except the inventions which are distinctly claimed herein, it being my intention to limit this application to the inventions recited in the claims, reserving to myself the right to claim all other novel features in a division of this application which I have filed.

What I claim is—

1. In a traction-engine, the combination of a boiler provided with an open-ended vertical tube arranged between the flues of the boiler, an engine mounted upon the boiler, a vertical shaft within the vertical tube and connected to the engine at its upper end, and gearing connecting the lower end of the shaft to the traction-wheel, substantially as set forth.

2. In a traction-engine, the combination of an axle adapted to vibrate in a horizontal plane, a compensating-gear mounted upon said axle, and a vertical shaft connecting the compensating-gear with the crank-shaft of the engine, substantially as set forth.

3. In a traction-engine, the combination of a compensating-gear mounted centrally on the front axle, and mechanism for shifting the position of the axle to change the direction of the movement of the engine, substantially as set forth.

4. In a traction-engine, the combination, with the front axle, the fifth-wheel L L′, and the crank-shaft, of the interposed gearing and mechanism for moving the idlers into and out of gear, substantially as set forth.

5. The combination, with the fifth-wheel, of the tripping-spurs or stops, adapted to engage with the shifting-lever O, substantially as set forth.

6. In a traction-engine, the combination, with the rear axle, of toothed segments upon opposite sides of the boiler, the horizontal shaft mounted in rear of the boiler and carrying pinions which mesh with the toothed segments, and mechanism for actuating the same for raising and lowering the rear end of the boiler, substantially as set forth.

7. In a traction-engine, the combination, with the rear axle, of toothed segments arranged

upon opposite sides of the boiler, a shaft mounted in rear of the boiler and carrying pinions which mesh with the segments, and a sliding horizontal shaft connecting the pinions with a driving-gearing at the front of the engine, substantially as set forth.

8. In a traction-engine, the combination, with a propelling-wheel and the wheel M′, for actuating the claws, of a set-screw and spring, whereby a yelding adjustment of said wheel M′ may be effected, substantially as set forth.

9. In a traction-engine, the combination, with the crank shaft, of the vertical shaft, two pinions upon the crank-shaft, a clutch mechanism adapted to connect said pinions alternately with the crank-shaft, two concentric horizontal gears meshing with the pinions on the crank-shaft, a power-wheel arranged below the concentric gears, and a yielding connection interposed between the concentric gears and the power-wheel, substantially as set forth.

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

CHARLES D. MONNOT.

Witnesses:
HARRY N. LOW,
J. S. BARKER.