(No Model.) 4 Sheets—Sheet 1.

J. McGEORGE.

LOCOMOTIVE HAND CAR.

No. 599,912. Patented Mar. 1, 1898.

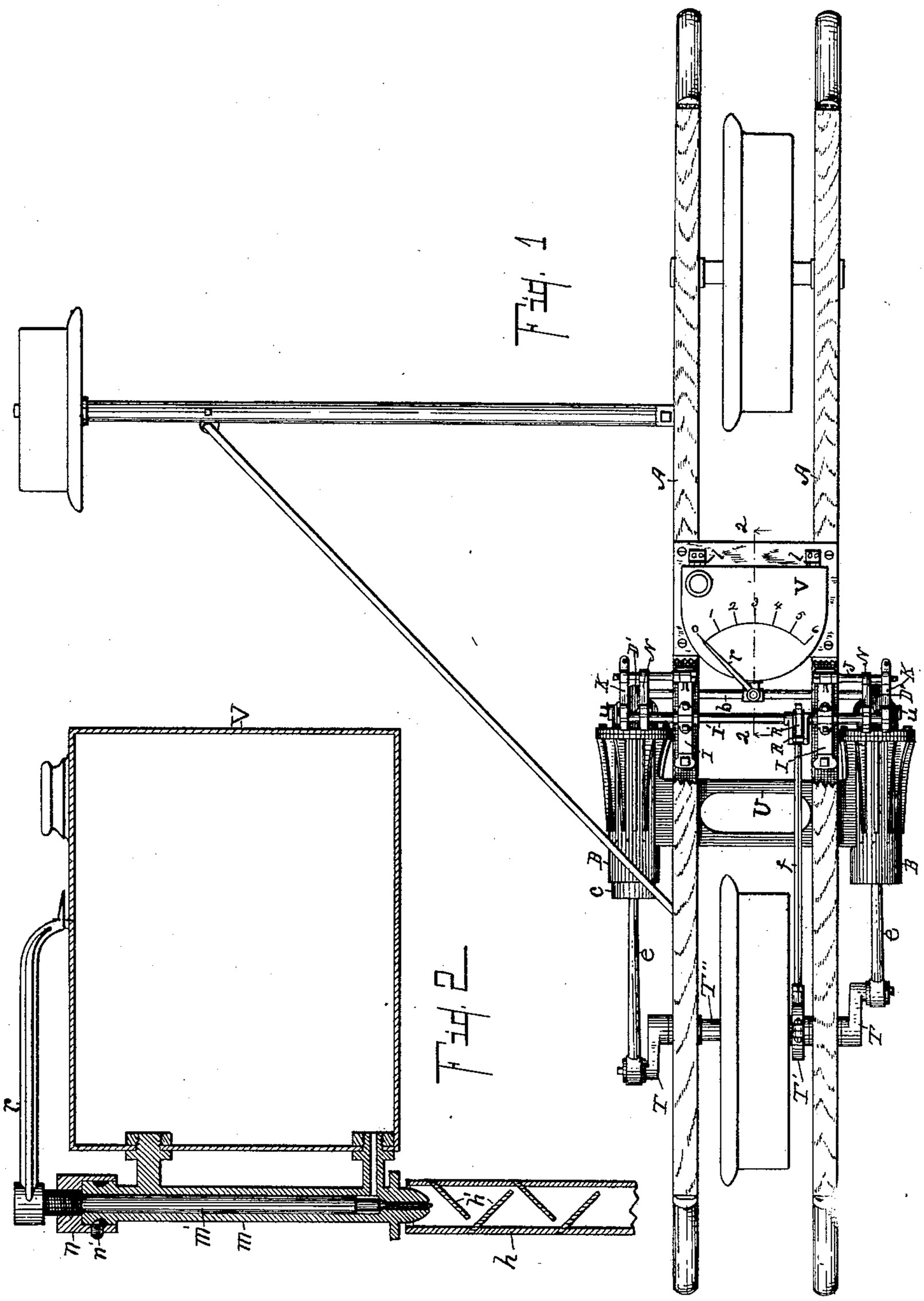

Fig. 1

Fig. 2

Witnesses:
Walter S. Wood
Vene E. Chappell.

Inventor,
James McGeorge
By Fred L. Chappell
Att'y.

(No Model.)

4 Sheets—Sheet 2.

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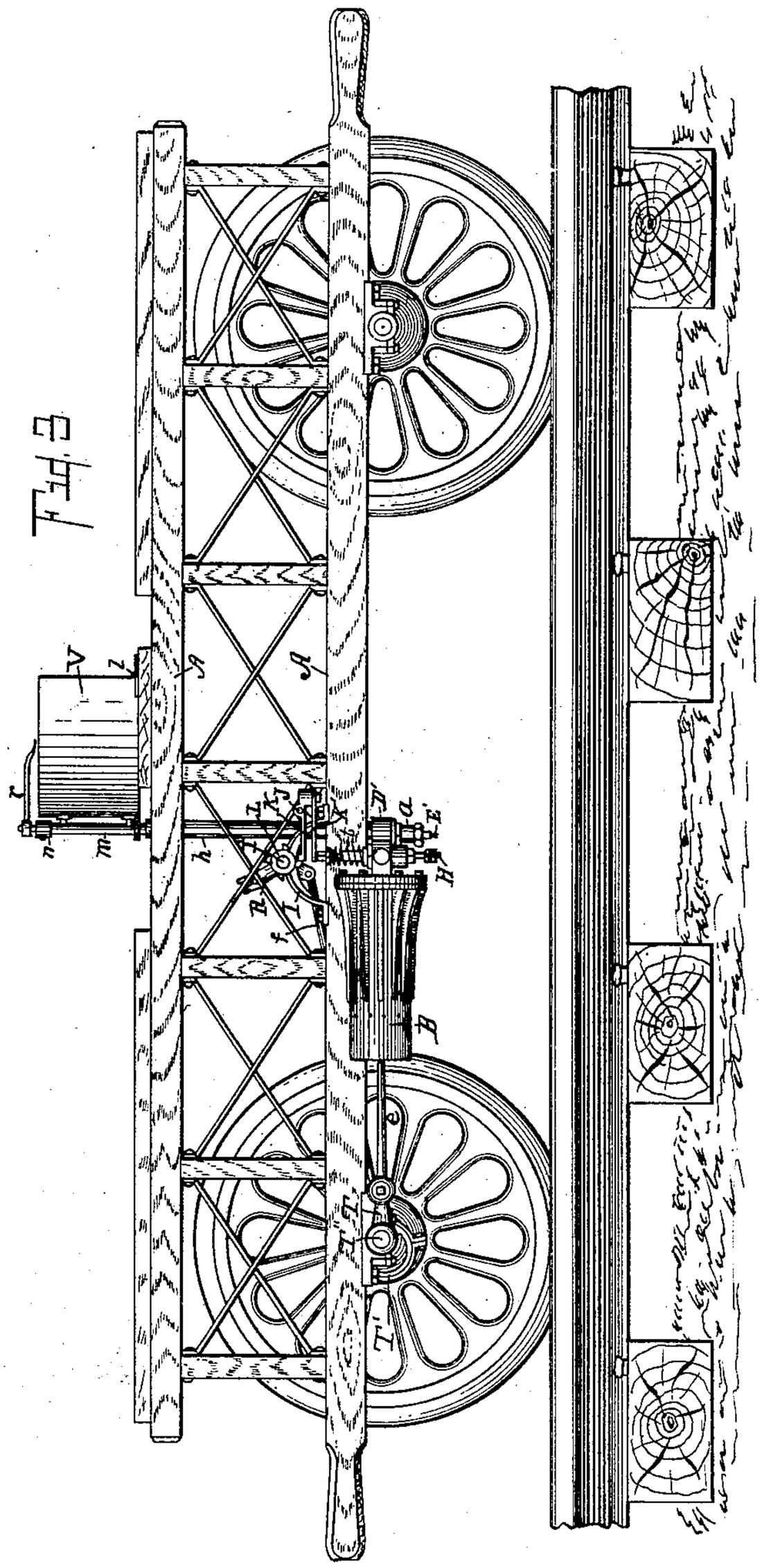

Witnesses:
Walter S. Wood
Vene E. Chappell.

Inventor,
James McGeorge
By Fred L. Chappell
Atty.

(No Model.)

4 Sheets—Sheet 3.

J. McGEORGE.

LOCOMOTIVE HAND CAR.

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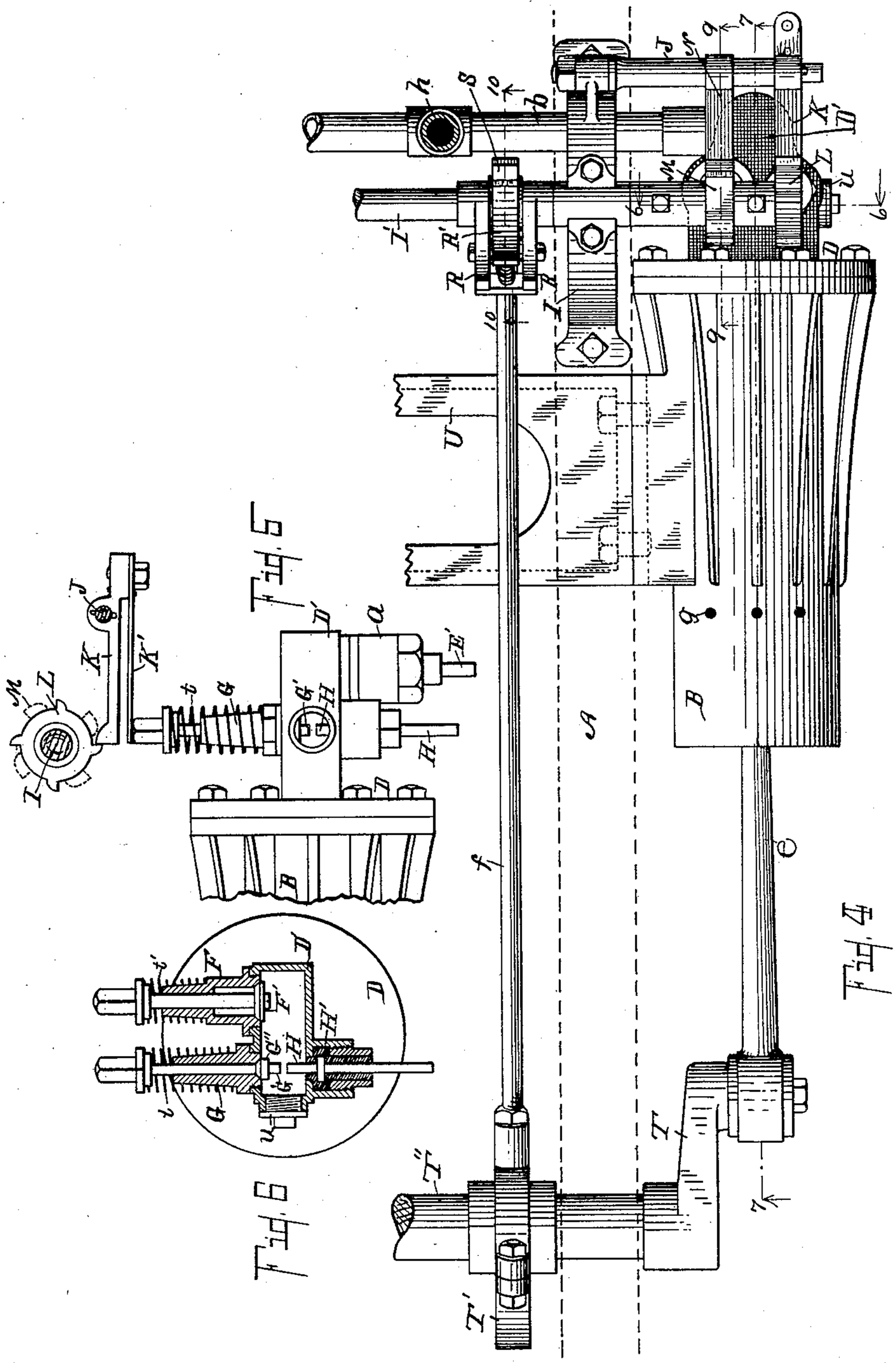
Patented Mar. 1, 1898.



Witnesses:
Walter S. Wood
Vene E. Chappell.

Inventor,
James McGeorge
By Fred L. Chappell
Att'y.

(No Model.)

4 Sheets—Sheet 4.

J. McGEORGE.

LOCOMOTIVE HAND CAR.

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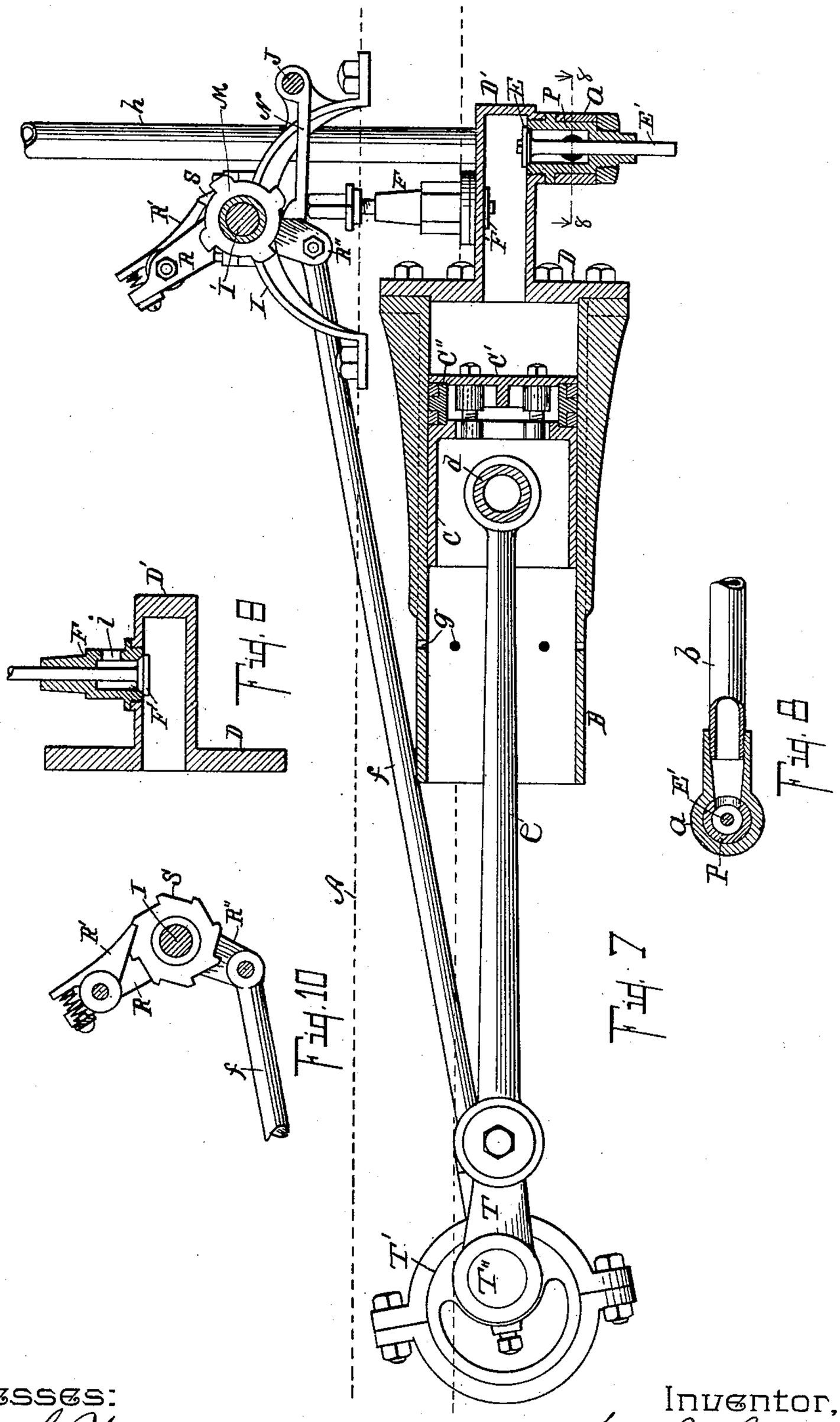

Witnesses:
Walter S. Wood
Vern E. Chappell.

Inventor,
James McGeorge
By Fred L. Chappell
Att'y.

UNITED STATES PATENT OFFICE.

JAMES McGEORGE, OF CLEVELAND, OHIO.

LOCOMOTIVE HAND-CAR.

SPECIFICATION forming part of Letters Patent No. 599,912, dated March 1, 1898.

Application filed November 2, 1895. Serial No. 567,755. (No model.)

To all whom it may concern:

Be it known that I, JAMES McGEORGE, a citizen of the United States, residing at the city of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Locomotive Hand-Car, of which the following is a specification.

My invention relates to a new and improved locomotive hand-car, and more particularly to a locomotive hand-car which derives its motive power from the use of gasolene or a similar hydrocarbon.

It also in the same connection relates to improvements in gasolene-engines which shall adapt them for use in such a vehicle and to other improvements in gasolene-engines.

The objects of my invention are, first, to provide a locomotive hand-car of very light weight, so that a man of ordinary strength can take it off and put it on the track without difficulty and handle the same easily anywhere; second, to provide a locomotive hand-car, deriving its power from gasolene, having very few parts; third, to provide a gasolene-engine for use in locomotive hand-cars which shall be effective and durable without requiring water-jackets around its cylinders or other like means for keeping it cool; fourth, to provide in a gasolene-engine improved means of igniting the charge within the cylinder; fifth, to provide an improved gear and mechanism for actuating the valves of a gasolene-engine; sixth, to provide improved means of vaporizing the gasolene as it is passed into the engine; seventh, to provide improved means of preventing leakage around the igniting device of a gas or gasolene engine; eighth, to provide for use in gasolene-engines an improved piston-head which shall fit securely and operate with very little friction, to prevent heating as much as possible; ninth, to provide a light and efficient motor adapted to the propulsion of light vehicles anywhere; tenth, to provide an improved feeding and vaporizing device for gasolene-engines. I accomplish these objects of my invention by the mechanism shown in the accompanying drawings, in which—

Figure 1 shows a top plan view of a three-wheeled hand-car embodying all of the features of my invention, no seat for passengers being shown in position. Fig. 2 is an enlarged detail sectional view, on line 2 2 of Fig. 1, through the tank and feeding device of my improved gasolene-engine. Fig. 3 is a side elevation of the device shown in Fig. 1, the seats being in place on the top. Fig. 4 is an enlarged detail view of one of the engine-cylinders, the valve mechanism, the eccentric, and its connections. Fig. 5 is an enlarged detail side view of the end of the cylinder shown in Fig. 4, the cap being removed from the peep-hole to the sparking device. Fig. 6 is a sectional view on line 6 6 of Fig. 4. Fig. 7 is a sectional view on line 7 7 of Fig. 4. Fig. 8 is a sectional view on a line corresponding to 8 8 of Fig. 7. Fig. 9 is a sectional view on line 9 9 of Fig. 4. Fig. 10 is a sectional view on line 10 10 of Fig. 4, showing the details of construction of the ratchets connected to the eccentric-rod.

All of the sectional views are taken looking in the direction of the little arrows at the end of the section-lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, A A represent the frame or body of the three-wheeled hand-car, the frame being supported by the two main wheels to one side of the track, and an auxiliary wheel on a suitable arm projects to the opposite rail of the track to balance and guide the same. This form and arrangement is a well-known construction and is not material to my invention, as the principles of my invention are applicable to any style of hand-car, or, in fact, to vehicles generally, though it is specially well adapted to the form and construction here shown. To each side of this frame or body is supported an engine-cylinder B, the same being secured together by a yoke U, extending across the frame. Cranks T T are located exactly opposite to each other on the axle T″ of the rear or driving wheel. In the cylinders are located suitable piston-heads C. Pitmen *e* are connected to the cranks T, and are pivotally connected at the central portion of the piston-heads on pivots *d*. It will thus be seen that the engine-cylinders alternate in their action. The engine-cylinders are made of comparatively thin metal heavily ribbed toward the bottom of the cylinder to give it additional strength, so that

the walls can be comparatively thin, so that they will quickly radiate the heat generated by the explosion of the mixture within.

The piston-head in the cylinder is made up of a main portion and a cap portion C′, which is bolted thereon by suitable bolts. Between the cap portion C′ and the main body is a ring C″, which is rabbeted out on each side to receive the packing-rings. By this construction it is possible to make the packing-rings of cast-iron and insert them in place without springing them or bending them by removing the cap C′ and placing the rings to each side of the ring portion C″ and screwing the cap on again. By this means the packing-rings can be made to fit accurately with very little pressure against the walls of the cylinder, which will of course reduce the friction to the minimum while securing a tight-fitting joint.

Just back of the piston-head when it is at the out end of its stroke are the main exhaust-ports *g*, which permit an immediate exhaust of all gases or products of combustion the instant the stroke is completed, thus permitting the spent gases to expand quickly into the atmosphere and prevent undue heat from confining the force of the explosion after its work is completed. The union of all of these features in a single gasolene-engine cylinder results in a cylinder which can be operated successfully in the open air without injury to the parts from heating and without the use of water-jackets or other means of cooling. This secures a very light construction of gas or gasolene engine cylinder admirably adapted for use in locomotive hand-cars and for the propulsion of vehicles generally. A suitable cylinder-head D is secured to the cylinder. Projecting forwardly from this head is a chamber D′, which of course connects with the cylinder, and in this chamber and in the walls of it are located the valves and the igniting-poles of my improved gasolene-engine.

E is the inlet-valve, which rests in a suitable seat in its casing P, supported in the lower wall of the chamber D′.

F′ is the exhaust-valve and is beveled to fit its valve-seat in its casing F, supported in the upper wall of chamber D′. Its stem projects up through the casing F above and has a cap at the top. A spring *t*′ is between the cap and casing F and holds the valve normally against its seat. Projecting upwardly above the lower walls of the chamber D′ is a steel pin H, with an annular projection thereon, which is clamped with a suitable insulating material H′, which retains it in position, and above this steel pin H is a downwardly-projecting pin G′, adapted to reciprocate through a suitable casing G and is supported in the upper position by spring *t* thereon. There is an enlargement G″ on the lower end of the pin G′, which is beveled on its upper side and seats itself in the casing G, like a valve in its seat, to prevent the escape of gases when the explosion takes place. The pin G′ is reciprocated up and down by means hereinafter described and causes a spark to pass when it separates from the pin H.

Any suitable electrical connections (not shown) are made to the pins H and G′ for forming an electric circuit to be broken by the mechanism described to cause the spark.

A suitable collar *a* is provided for the downwardly-projecting valve-casing P and is clamped thereon by a suitable nut at the bottom. This collar is open at one side and affords a connection for the supply-pipe *b*, which extends straight across and connects to the inlet-valve casing of the opposite cylinder. A pipe *h* is connected at the center by an ordinary T connection and extends upwardly to the supply-tank. This pipe *h* contains downwardly-sloping partitions *h*′, alternating with each other from opposite sides and extending from one side of the pipe almost to the opposite to form a zigzag passage down the same. The supply-tank V is placed above and has a delivery-opening into the tube *m*, which contains a rod *m*′. The rod *m*′ is reduced in size toward its lower end to form a suitable passage for the gasolene contained in the tank V and is reduced to a comparatively fine rod at the bottom, with a tapered portion just above it for screwing onto a suitable valve-seat. To the upper end of the tube *m* is secured a screw-threaded cap *n* by a suitable set-screw *n*′. The upper end of the rod *m*′ is threaded with a very fine thread for raising and lowering it to open and close the valve below slowly, so that the flow of gasolene from the tank can be exactly and accurately regulated. A pointer *r* projects from the top of the rod *m*′ and indicates on a suitable scale on the top of the tank V the exact position of the valve. The front of the tank V is connected by suitable hinges *l* to the frame of the carriage, so that it can be tipped up and the valve mechanism and its condition be easily examined. An air-space is left around the lower end of the tube *m* into the tube *h* for the admission of air to mix with the gasolene as it passes on its way to the cylinders. The air being drawn down by the action of the piston passes rapidly over the inclined partitions *h*′ through any gasolene that may be dripping from there out through the delivery-pipe *e*, past the inlet-valve E, into the cylinder.

Extending across the frame and supported on suitable brackets I is a shaft I′, by which the mechanism for actuating the auxiliary exhaust and igniting device is actuated. Pivoted on pivot J is an arm N, adapted to rest on the upper end of the valve-stem to the exhaust-valve F′, and on its outer end is borne a small upwardly-projecting cam. A cam-wheel M is secured to the shaft I′ opposite it, having four cams distributed equidistant around its periphery, which act upon it and open the auxiliary exhaust-valve F′, allowing it to close when the wheel passes. To the op-

posite end of the pivot J is secured another arm K, with a similar cam on its upper side, which is actuated by a similar cam-wheel L on the shaft I′, having four cam portions thereon equidistant apart. A comparatively stiff spring K′ extends along the under side of the arm K, parallel therewith and at a little distance therefrom. This spring presses upon the upper end of the pin G′ and is much stronger than the spring *t*, which sustains that pin in the elevated position, as above stated. There are four cams on the wheel L, and there are four cams on the wheel N, which alternate with each other. Similar cam-wheels are on each end of the shaft to operate the similar parts of the opposite cylinders, except their position in relation to the circumference of the shaft is exactly opposite. The cam-wheels at the two ends for actuating the igniting device alternate with each other and the cam-wheels for actuating the auxiliary exhaust at the two ends of the shaft also alternate with each other, and the cams on the exhaust cam-wheel and the igniting cam-wheel at each end of the shaft also alternate with each other.

A suitable eccentric T′ is placed upon the axle T″ of the driving-wheel, and the eccentric-rod *f* extends therefrom forwardly and is pivotally connected to the arm R″, supported on shaft I′. A ratchet-wheel S, having eight teeth corresponding in position to the eight cam-like projections on the cam-wheels for operating the igniting and the auxiliary exhaust device, is on the shaft I′. An arm R projects upwardly and carries a pawl R′, adapted to engage the teeth on the ratchet-wheel S. The pawl R′ is forced to its position to act promptly by a coiled spring under its outer end. The throw of the eccentric T′ actuates the ratchet through arm R″ sufficient to rotate the shaft one-eighth over at each revolution, or the distance of one of the teeth, so that the motion of the eccentric at each revolution of the driving-shaft will move the shaft I′ one-eighth of a revolution.

Having thus enumerated the parts of my machine, I desire to state that the cylinders, their igniting devices, their exhaust devices, and their inlet devices are identical on each side of the machine, but are so connected that they are actuated alternately.

I will now trace the operation of my machine, so that the use and operation of all the parts described will be clearly understood.

When the machine is started and set in motion by a push, gasolene from the tank drips down from the tube *m* onto the partition *h′* in the tube *h*. Air will be drawn through the tube *h*, down through the tube *b*, up past the inlet-valve E′, into the chamber D, and into the right-hand cylinder B as its piston is being drawn out. As the car moves on by its acquired momentum the mixture of air or gasolene will be compressed in the cylinder, the ratchet, through the eccentric, will move the shafts one-eighth over the cam-wheel L, will actuate the lever K, which will press down the igniting-pin G′, which will press against the pin H, and will separate quickly when the cam L passes. This will break the current, causing a spark, which will ignite the charge and drive the piston toward the outer end of the cylinder. When it reaches its farthest limits, the pent-up gases will exhaust through the series of ports *g* with very slight heating effect. The piston will be then returned, and as it returns the eccentric, through its connections, will actuate the shaft I′, which will turn the cam-wheel M against the arm N and will open the exhaust-valve F′, so that all of the residue of the spent gases is excluded from the cylinder by the return stroke of the piston. At the inner end of the return stroke the cam passes and the exhaust-valve is closed. On the next outward stroke the mixture of air and gasolene-vapor is again drawn in and the processes as above enumerated are repeated. This operation is alternated in the cylinder in the opposite side of the frame. As one exhausts the other ignites, and vice versa.

Having thus described my improved gasolene locomotive hand-car, I desire to state that it can be greatly varied in its details without departing from my invention. It can be adapted for use and is capable of use on any size or style of hand-car and is adapted for use for vehicle propulsion generally, and by increasing the number of cylinders can be made very effective for propelling locomotives of large size.

Many features of the gasolene-engine are adapted for use on gas or gasolene engines generally and will be found highly satisfactory, particularly in small-sized engines, as the engine is very effective and dispenses to a very large extent with all cooling means.

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

1. In a gasolene-engine the combination of an unjacketed engine-cylinder B, made of comparatively thin metal with heavy ribs on the exterior to enable the same to radiate its heat readily and at the same time secure the required strength containing a series of exhaust-ports *g*, just within the outer end of the stroke of its piston; a piston therein consisting of a main body with a cap portion C′, with a rabbeted ring C″, between which suitable packing-rings are fitted into the rabbeted grooves of the ring C″; a suitable inlet-valve E, into said cylinder, a suitable auxiliary exhaust-valve F′, into the bottom of said cylinder; a suitable igniting device with means for actuating the same coacting together for the purpose specified.

2. In a gasolene-engine the combination of an unjacketed engine-cylinder B, made of comparatively thin metal heavily ribbed on the exterior to enable the same to radiate its heat readily and at the same time be of the required strength containing exhaust-ports *g*, just within the outer stroke of its piston; a

piston therein suitably connected to deliver the force of the explosion and acquiring force to return the same; an auxiliary exhaust-valve at the bottom of the cylinder through which the residuary spent gases are exhausted after the principal exhaust through the port *g;* for the purpose of providing a non-heating gas or gasolene engine cylinder as specified.

3. In a gasolene-engine the combination of an unjacketed engine-cylinder B, made of comparatively thin metal heavily ribbed on the exterior to enable the same to radiate its heat readily and at the same time be of the required strength containing exhaust-portage just within the outer stroke of its piston; a piston therein suitably connected to deliver the force of the explosion and acquiring force to return the same; for the purpose of providing a non-heating gas or gasolene engine cylinder as specified.

4. In a gasolene-engine the combination with an engine-cylinder of the chamber D′, at the head thereof; a stationary post H, projecting into said chamber and supported in an insulating material H′; a reciprocating pin G′, opposite said post H, reciprocating in a suitable casing G; an annular enlargement on said pin beveled to seat itself like a valve; a spring *t*, acting upon the pin G′, to hold it away from the post H; an arm K, pivoted above and to one side of the pin G′, and projecting over the upper end of the same; a spring K′, parallel with and below the arm K, of greater tension than the spring *t;* a cam-wheel L, having cam projections thereon to act upon the arm K; and suitable connections from cam-wheel L, to moving parts of the engine so that the cam will press the pin G′, against the post H, and will allow it to separate when the cam passes to produce a spark to ignite the charge in the engine-cylinder as specified.

5. In a gasolene-engine the combination with an engine-cylinder of the chamber D′, at the head thereof; a stationary post H, projecting into said chamber and supported in an insulating material H′; a reciprocating pin G′, opposite said post H, reciprocating in a suitable casing G; a spring *t*, acting upon the pin G′, to hold it away from the post H; an arm K, pivoted above and to one side of the pin G′, and projecting over the upper end of the same; a spring K′, parallel with and below the arm K, of greater tension than the spring *t;* a cam-wheel L, having cam projections thereon to act upon the arm K; and suitable connections from cam-wheel L, to moving parts of the engine so that the cam will press the pin G′, against the post H, and will allow it to separate when the cam passes to produce a spark to ignite the charge in the engine-cylinder as specified.

6. In an igniting device for a gasolene-engine the combination of a stationary insulated pin; a reciprocated pin opposite thereto adapted to contact therewith; a light spring for holding said reciprocating pin away from the stationary pin; and suitable means of actuating the reciprocating pin; a spring between said means and the pin of greater strength than the spring supporting the pin to permit of the parts being forced tight together and compensate for wear so that the lighter spring will separate the reciprocating pin and the stationary one when pressure is released to induce an electric spark as specified.

7. In a gasolene-engine the combination of an unjacketed engine-cylinder with thin walls to enable it to radiate its heat readily with exhaust-portage just within the outer stroke of its piston; a piston therein suitably connected to deliver the force of the explosion; a second exhaust-valve at the bottom of the cylinder through which the residuary spent gases are exhausted to provide a non-heating gas or gasolene engine cylinder for the purpose specified.

8. In a gasolene-engine the combination of an unjacketed engine-cylinder with thin walls to enable it to radiate heat readily with a series of exhaust-ports just within the outer stroke of its piston; a supply-pipe for said cylinder with means of evaporating the gasolene directly into the cylinder to cool the same; a piston within said cylinder suitably connected to deliver the force of the explosion; a second exhaust at the closed end of the cylinder through which the residuary spent gases are exhausted to provide a non-heating gasolene-engine for the purpose specified.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

JAMES McGEORGE. [L. S.]

Witnesses:
E. H. HENDERSON,
M. J. HUSS.