

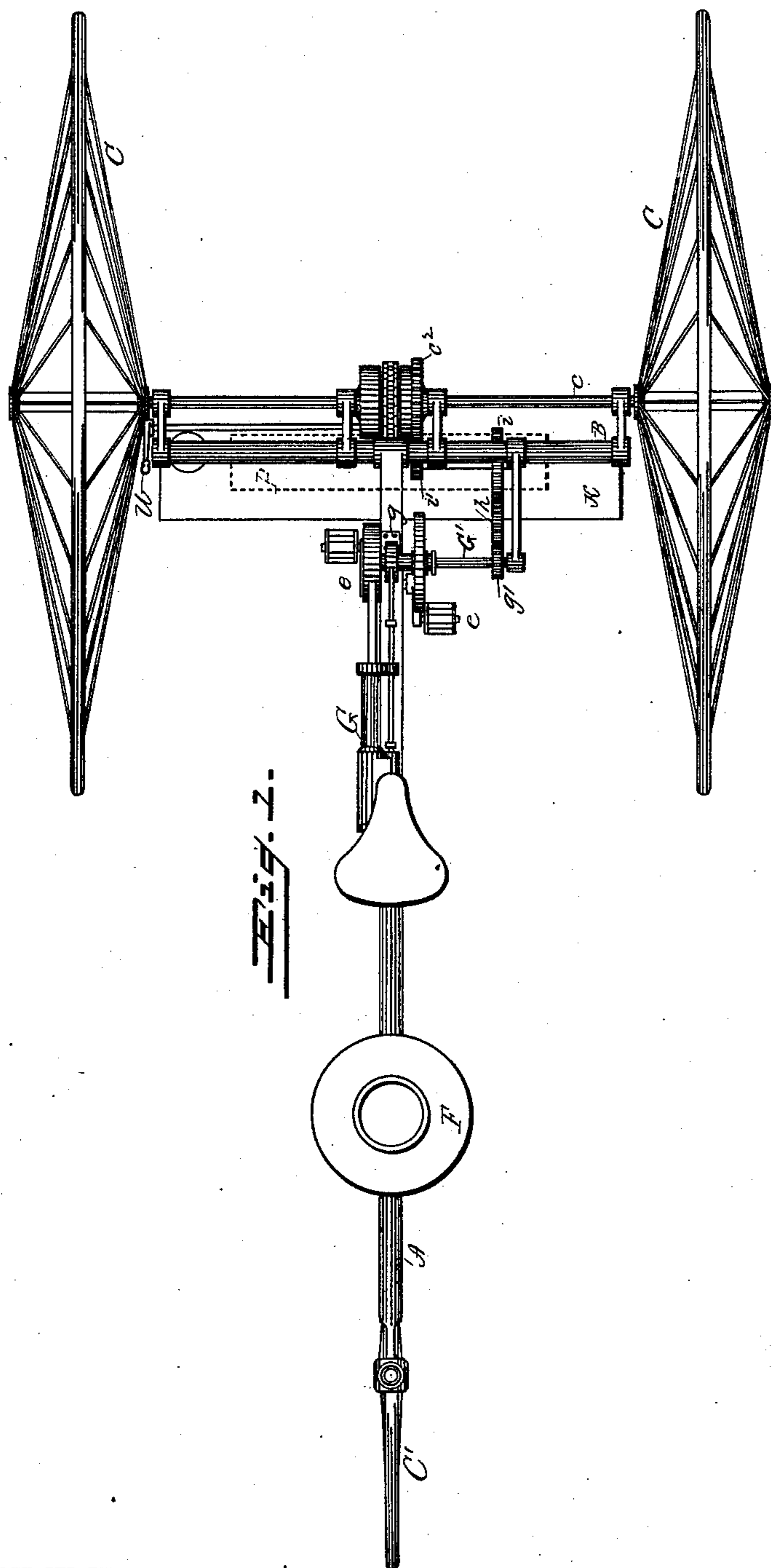
(No Model.)

3 Sheets—Sheet 1.

L. D. COPELAND.
STEAM TRICYCLE.

No. 360,760.

Patented Apr. 5, 1887.



WITNESSES

Willard Powell.

J. B. M. Giv.

INVENTOR

Lucius D. Copeland
By Connolly Bros.
Attorneys

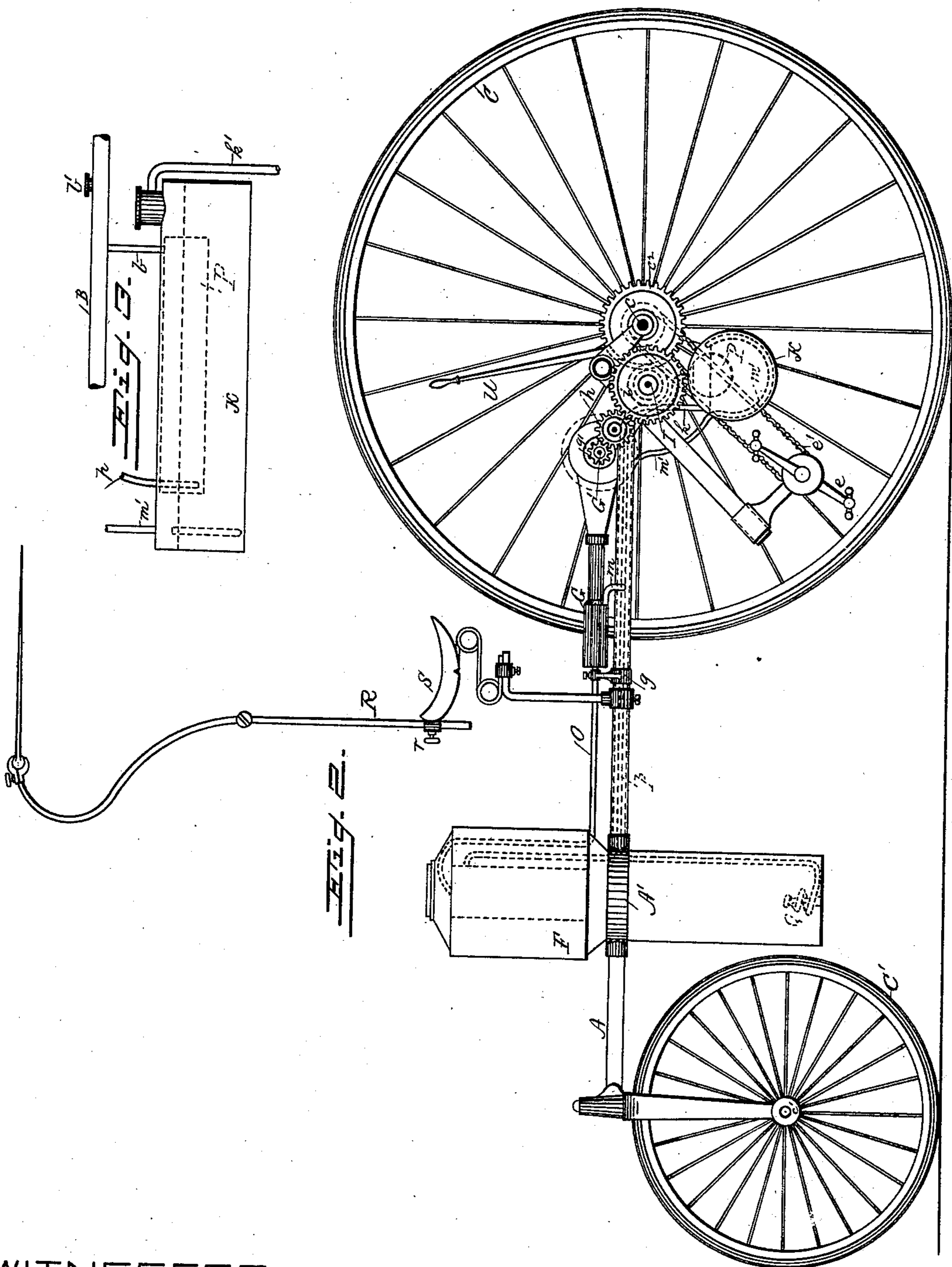
(No Model.)

3 Sheets—Sheet 2.

L. D. COPELAND.
STEAM TRICYCLE.

No. 360,760.

Patented Apr. 5, 1887.



WITNESSES
Will S. Powell.
J. B. McGiv.

INVENTOR
Lucius D. Copeland,
By Connolly Bros.,
Attorneys.

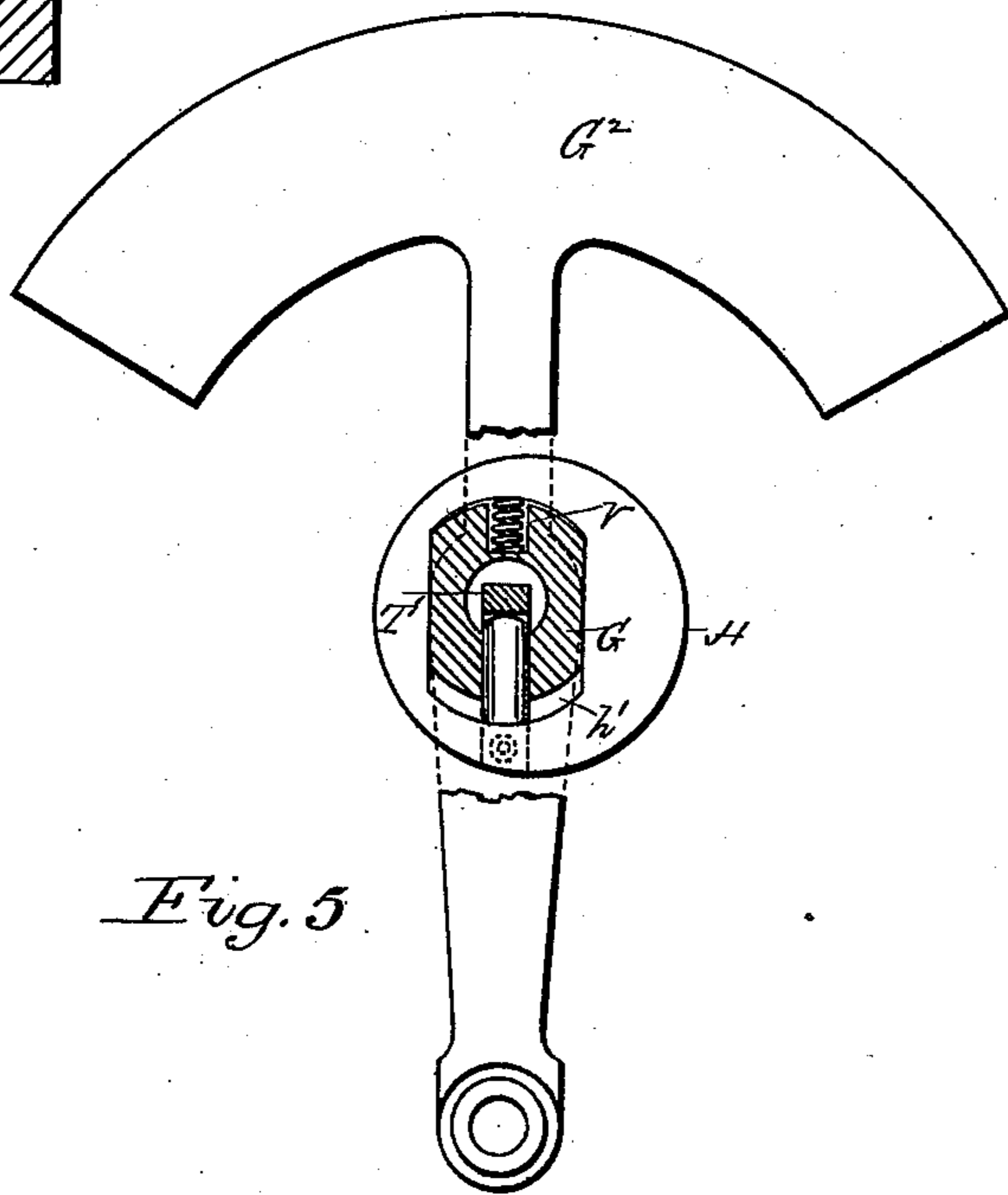
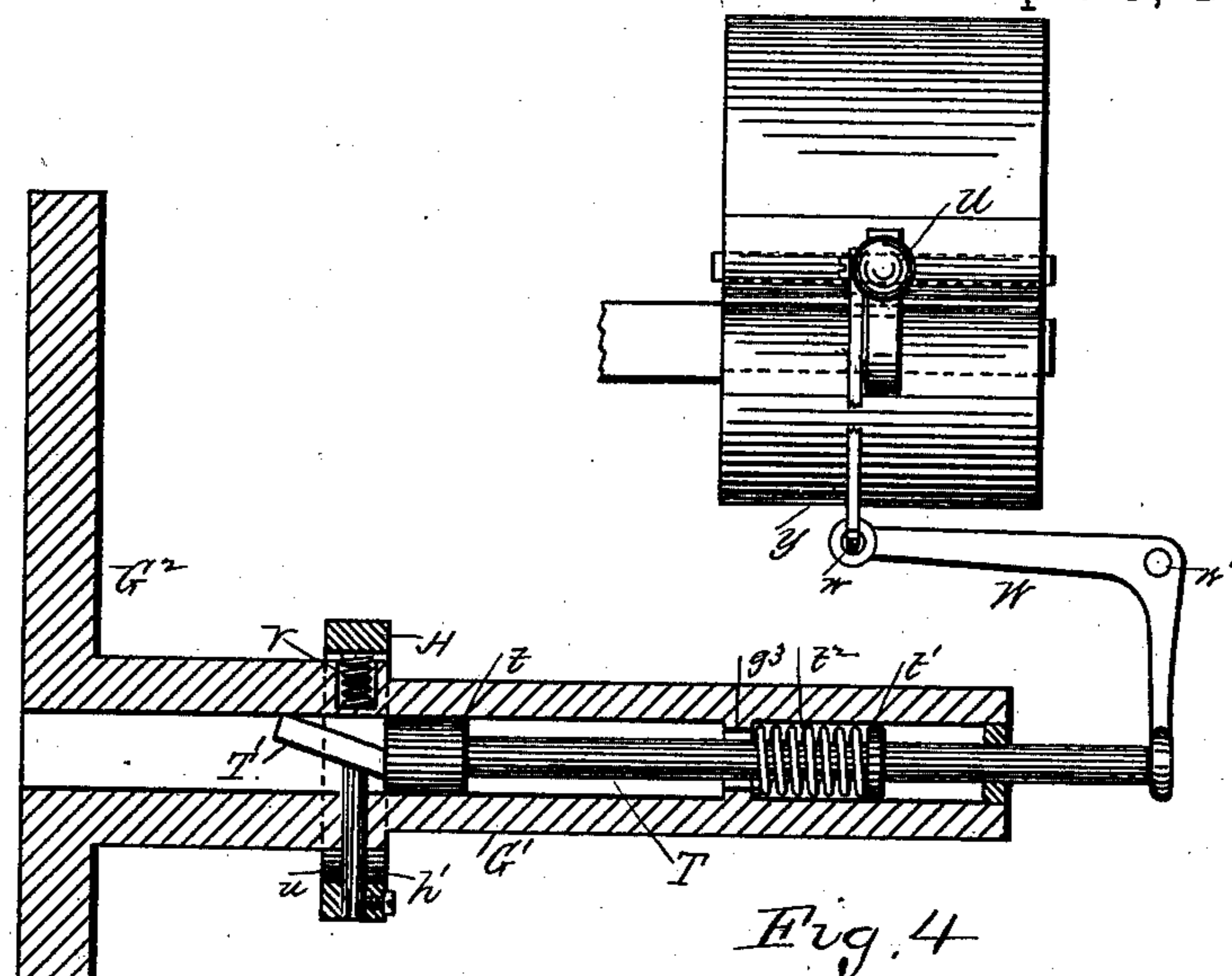
(No Model.)

L. D. COPELAND.
STEAM TRICYCLE.

3 Sheets—Sheet 3.

No. 360,760.

Patented Apr. 5, 1887.



WITNESSES
Willbde Powell.
J. B. McGinn.

INVENTOR
Lucius D. Copeland,
By Connolly Bros.,
Attorneys.

UNITED STATES PATENT OFFICE.

LUCIUS D. COPELAND, OF CAMDEN, NEW JERSEY.

STEAM-TRICYCLE.

SPECIFICATION forming part of Letters Patent No. 360,760, dated April 5, 1887.

Application filed October 11, 1886. Serial No. 215,882. (No model.)

To all whom it may concern:

Be it known that I, LUCIUS D. COPELAND, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Steam-Tricycles; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a plan view of a tricycle embodying my improvements. Fig. 2 is a vertical longitudinal section of same. Fig. 3 is a detached view of water and oil tanks. Fig. 4 is a vertical longitudinal section of adjustable valve-eccentric; and Fig. 5 is an elevation, partly in section, of the same.

My invention has for its object to provide an improved construction whereby a tricycle or similar riding-vehicle is adapted to be run by a steam-engine as a motor, the engine and its boiler and water and fuel supply appliances being mounted on and carried with the machine.

My improvements consist in the peculiar construction and combinations of parts herein-after described, and specifically claimed.

The accompanying drawings illustrate a tricycle which, in its general features, except as modified to adapt it to my improvements, is of the usual construction. It has a frame composed of a backbone, A, and a cross-bar, B, each of which is a metal tube. Said frame is supported upon wheels C C C', having axles c and c', the forward wheels having the usual or any suitable means of pedal propulsion, as cranks or stirrups e e and a chain belt, e', running over suitable sprocket-wheels.

F represents a steam-boiler, which may be of any suitable construction, but is preferably constructed conformably to the terms of an application of mine of even date herewith for Letters Patent for improvements in steam-boilers, Serial No. 215,881; and G represents a steam-engine, which, also, may be of any suitable construction, but is preferably constructed as described in another application of mine of even date herewith for Letters Patent for improvements in steam-engines, Serial No. 215,883. The boiler F is supported on the frame of the tricycle by being placed, as shown, in a ring,

A', fitted in the backbone A or said boiler may be mounted in any other suitable manner. The engine rests upon the backbone A, and is secured thereto by brackets g g, fastened by screws; or it may be otherwise fastened in position.

G' represents the crank-shaft of the engine, which carries a gear-wheel, g', that meshes with an idler, h, the latter gearing with a toothed wheel, i, fast on a shaft, I. Said shaft has another gear-wheel, i', which meshes with a like wheel, c', on the axle c, so that when the crank-shaft G' revolves the axle will turn and the machine move.

Beneath the cross-piece B is a water-tank, K, which feeds the boiler through a pipe, k, which passes through the backbone A. The exhaust from the engine discharges through a pipe, m, into the backbone A, and is carried therefrom by another pipe, m', which leads into and passes nearly all the way around the tank K, as shown in dotted lines in Figs. 2 and 3, discharging near the top of the said tank, as shown. Should there be any exhaust-steam left after condensation takes place, it may find an outlet through the pipe k' and discharge near the ground.

Tank K is constructed for the use of ice for condensing purposes, and after being melted is used, together with the water produced by condensation, for feed-water for the boiler; or it may be filled with water instead of ice. This produces rapid condensation of the exhaust and economizes water, so that a much longer run can be made than would otherwise be possible. If the exhaust were directly into the open air, the water-supply would soon be exhausted. It is important with steam-tricycle riding to economize water as much as possible, to avoid delay in getting a fresh supply, owing to the difficulties and uncertainties of getting a supply when wanted.

The steam from the boiler is supplied to the engine by a pipe, O, and oil is supplied for heating said boiler from a reservoir, P, to an atomizer or burner, Q, by means of a pipe, p. This pipe p also passes through the backbone A, and its oil is thereby heated by the exhaust-steam, the backbone thus serving as a heater for the feed-water and oil. The oil-reservoir P is located inside the water-tank K, thereby insuring safety or lessening danger of explosion,

and it may be filled by directly pouring the oil into it; or it may connect by a pipe, *b*, with the cross-piece *B*, and the latter have a filling-opening, *b'*, with suitable stopple, through which the oil is poured in.

The oil may be drawn to the atomizer or burner by a vacuum or exhaust action of the latter; or any suitable force-feed may be employed for the purpose, and a pump or an injector may be used for feeding the boiler.

Whenever desired, the tricycle may be moved by steam and leg power, or by either separately.

The saddle for a single occupant is shown at *S*; but two seats may be provided, in the usual or any suitable manner. To protect the rider, a canopy sustained on a rod, *R*, held and vertically adjustable on the seat by means of a set-screw, *r*, is provided.

Though I have described my improvements as on a tricycle, they may be applied to other forms of velocipedes, and my invention therefore extends to other riding-vehicles, and is not confined to one having three wheels.

A brake is provided for stopping the tricycle in the usual manner, and *U* indicates the lever thereof. This lever has connection with the engine-crank and valve-eccentric in such manner that the extent to which the engine shall work by expansion is brought under control. The construction adopted for this purpose is shown in detail in Figs. 4 and 5, where *G*² is the crank, *G'* the crank-shaft, and *H* the valve-eccentric, the latter having a slot, *h'*, in which the crank-shaft fits and which permits the movement of said eccentric on said shaft, so as to alter the eccentricity of the former and thereby vary the position at which steam is cut off, and so regulate the extent to which the working of the engine shall depend upon expansion.

The crank-shaft is made hollow and receives a rod, *T*, having a head, *t*, and a collar, *t'*, a spiral spring, *t*², pressing against the latter and against a shoulder, *g*³, in the crank-shaft and tending to move said rod outwardly, or to the right in Fig. 4. The head *t* has an inclined projection, *T'*, which bears against a radial sliding pin, *u*, secured to the eccentric and passing through an opening in the crank-shaft.

V is a spiral spring in a socket in the crank-shaft and bearing against the eccentric. When the rod or slide *T* is moved inwardly or to the left, the inclined piece *T'*, by its pressure on the pin *u*, moves the eccentric laterally in one direction, and it is moved in the opposite direction by spring *V* when the spring *t*² moves

said rod *T* outwardly, or to the right in the drawings. To move the rod *T* inwardly, any due connection between it and the brake-lever may be made, so that when the brake is put on such outward movement will be effected. As suitable means for the purpose, I have shown a bell-crank lever, *W*, one arm of which is connected at *w* with the brake strap or shoe *Y*, the other arm bearing against the exposed projecting end of rod *T*. The bell-crank lever *W* may be fulcrumed at *w'* on the frame of the tricycle.

By the means just described, when the brake is put on, the cut-off (which depends, as usual, upon the throw of the eccentric) is adjusted so that the steam is entirely cut off or not admitted at all. The point of cut-off will depend upon the distance the brake-lever is thrown after it has released the brake-drum, sufficient steam being admitted to propel the machine at any desired speed.

What I claim as my invention is—

1. In a steam-tricycle, the combination, with the backbone or tubular frame-piece *A*, boiler *F*, and engine *G*, of pipes passing through said backbone or tubular frame-piece and exhaust discharging into the latter, whereby said backbone or frame-piece forms a heater for the water and oil, substantially as shown and described.

2. In a steam tricycle or riding-vehicle, the combination, with its engine and feed-water tank, of a pipe, *m'*, which conveys the engine-exhaust to such tank, said pipe entering at or near the top of said tank, passing around by the side of the latter, and discharging near the top or above the surface of the feed-water, substantially as shown and described.

3. In a steam-tricycle or riding-vehicle, the combination, with the engine, valve-eccentric, and brake thereof, of intermediate connections between said eccentric and the brake-lever, whereby, when the brake is put on and thrown off, the eccentric will be moved to vary the cut-off, substantially as shown and described.

4. In a steam-tricycle or riding-vehicle, a tubular frame forming a receptacle for oil or liquid fuel for a burner for a steam-boiler on said vehicle, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 8th day of October, 1886.

LUCIUS D. COPELAND.

Witnesses:

WILL H. POWELL,
R. DALE SPARHAWK.