(No Model.) 3 Sheets—Sheet 1.

J. LEACH & W. V. HIRST.

CAR STARTER.

No. 437,698. Patented Oct. 7, 1890.

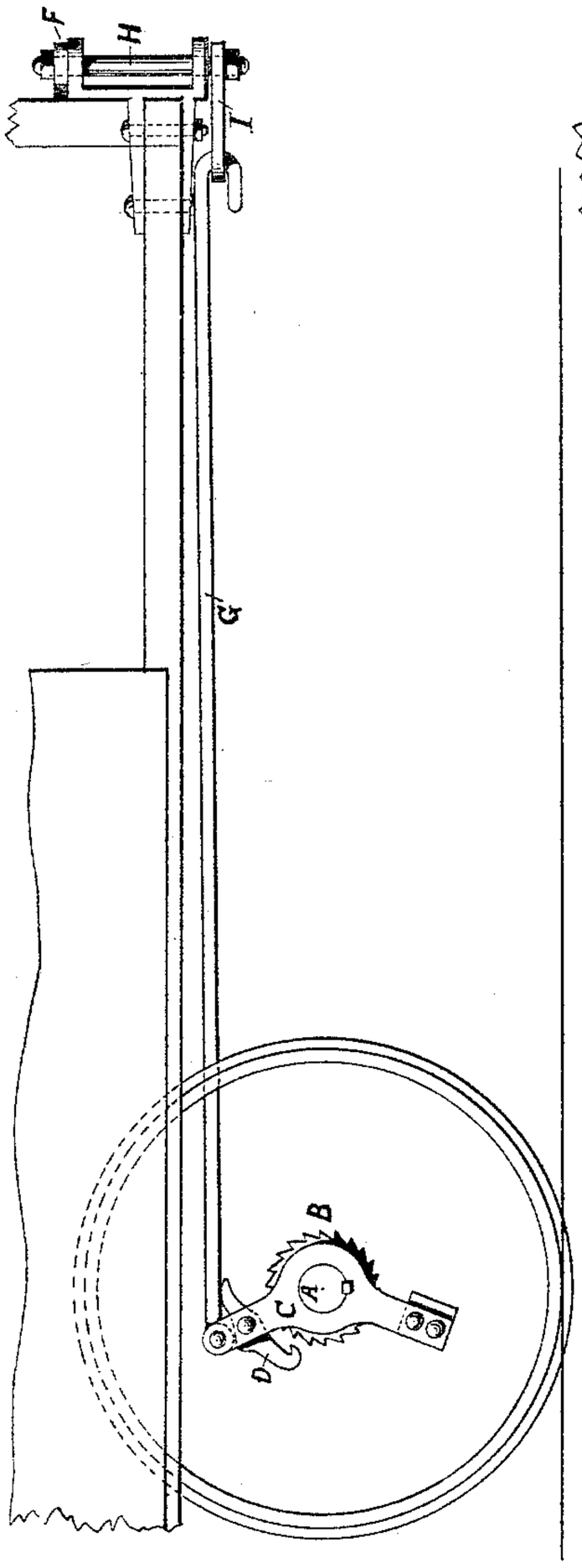

Fig. 1.

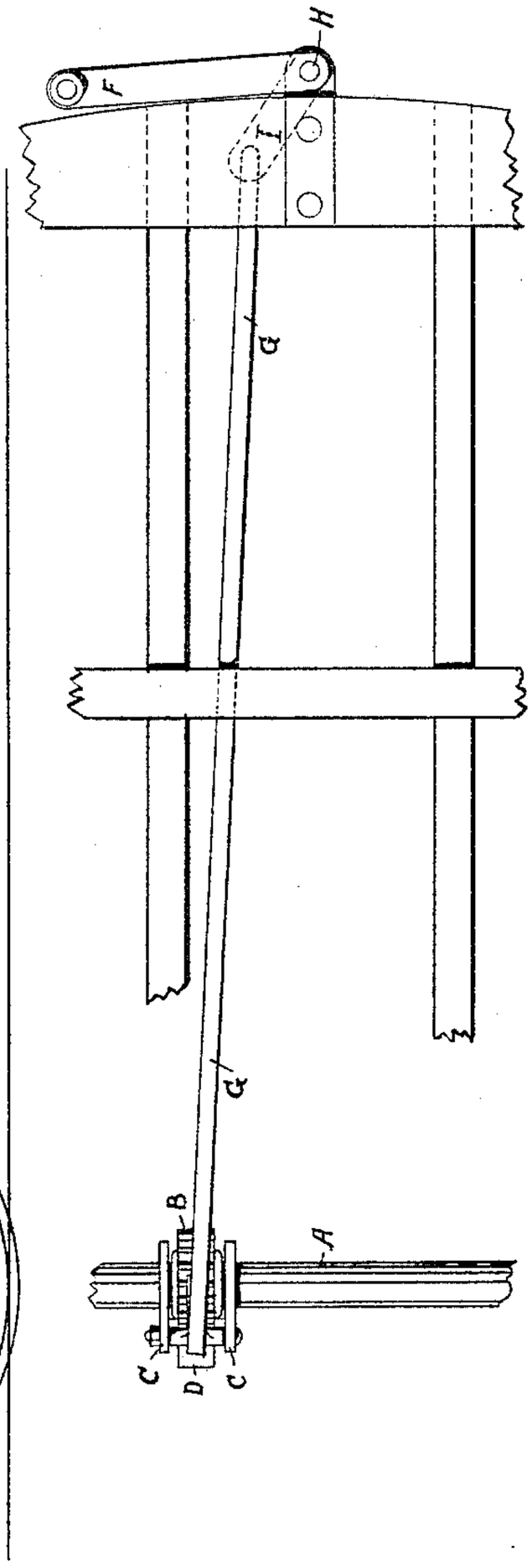

Fig. 2.

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(No Model.) 3 Sheets—Sheet 2

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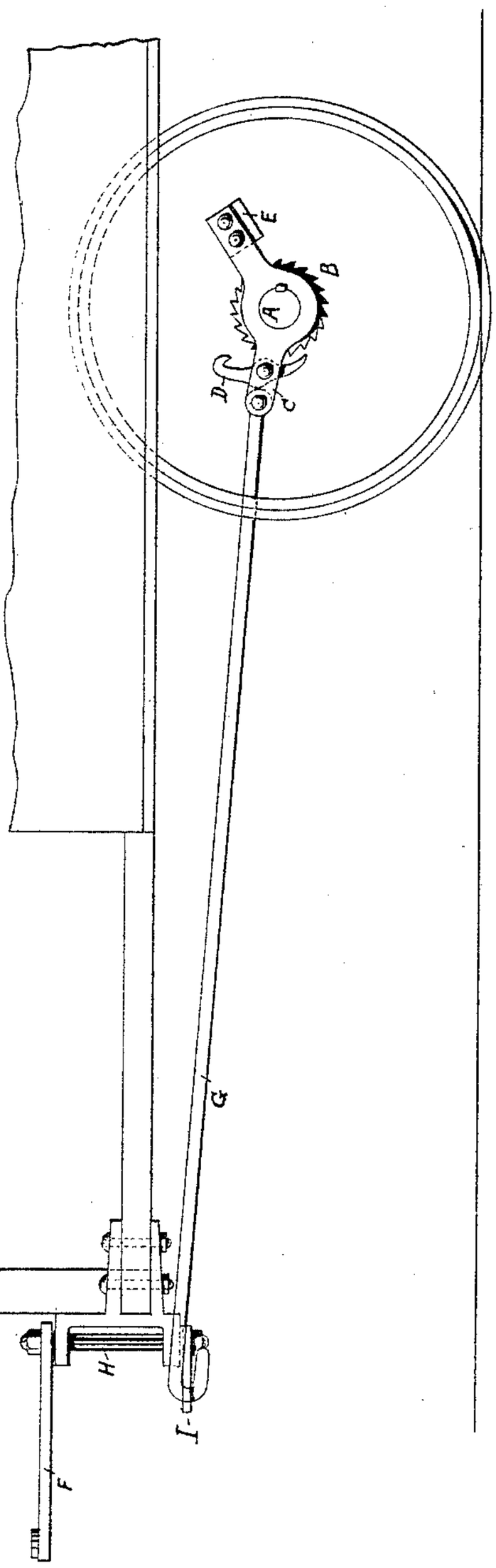

Fig. 3.

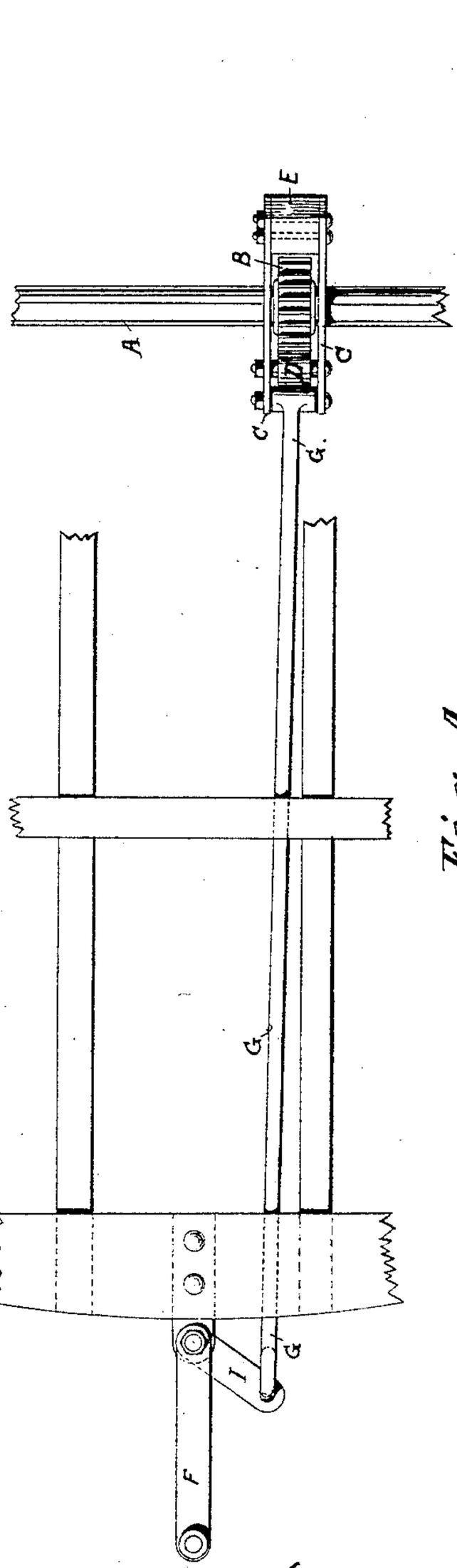

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

J. LEACH & W. V. HIRST.

CAR STARTER.

No. 437,698. Patented Oct. 7, 1890.

Fig. 5.

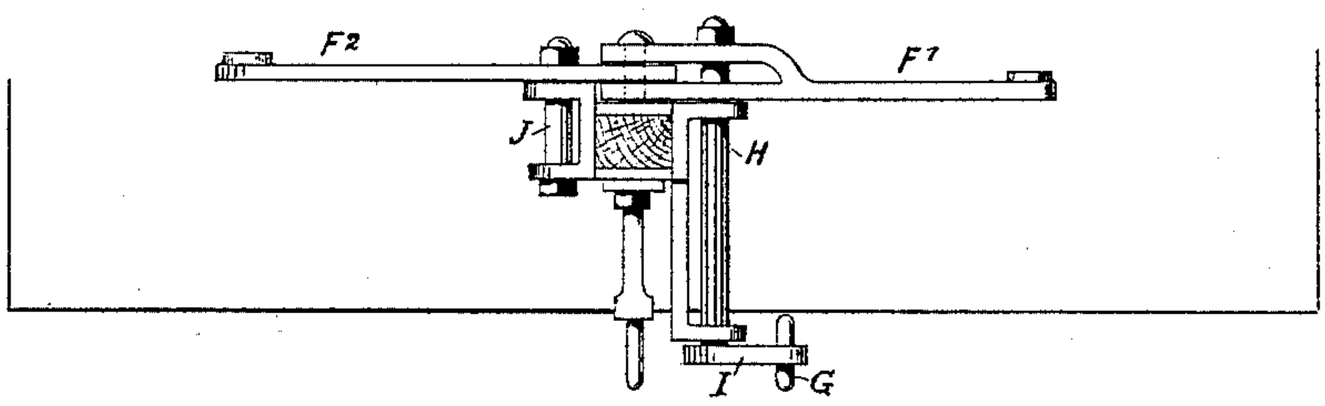


Fig. 6.

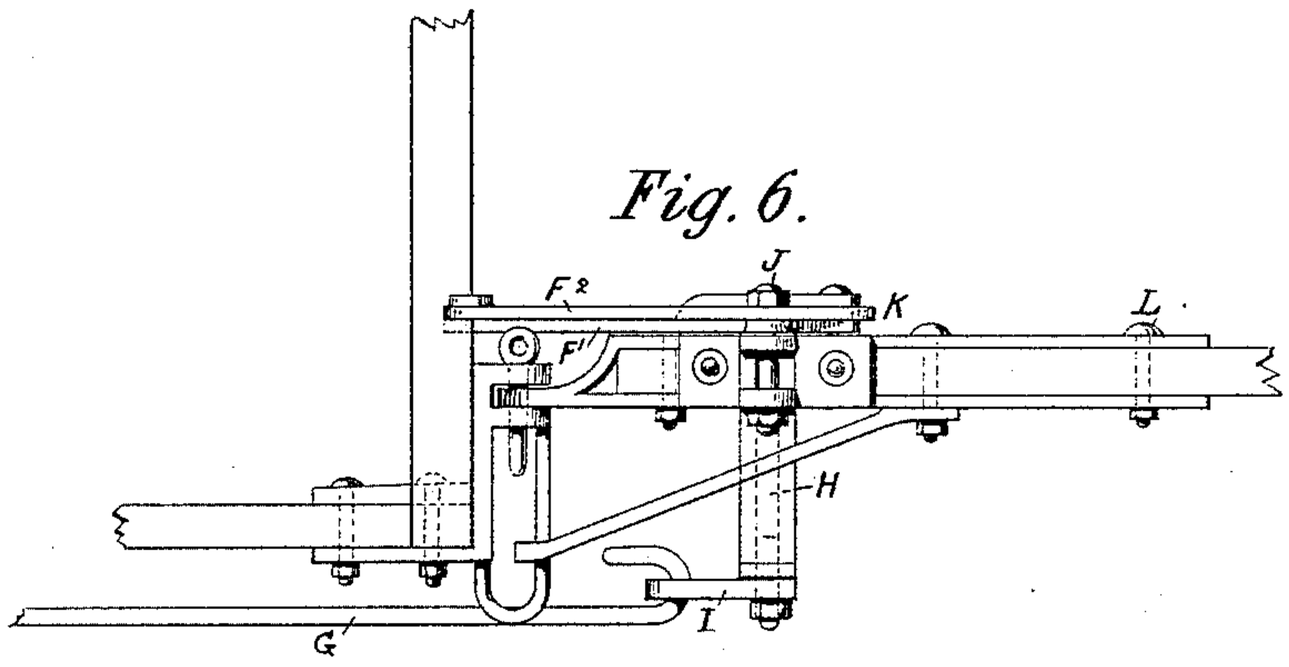
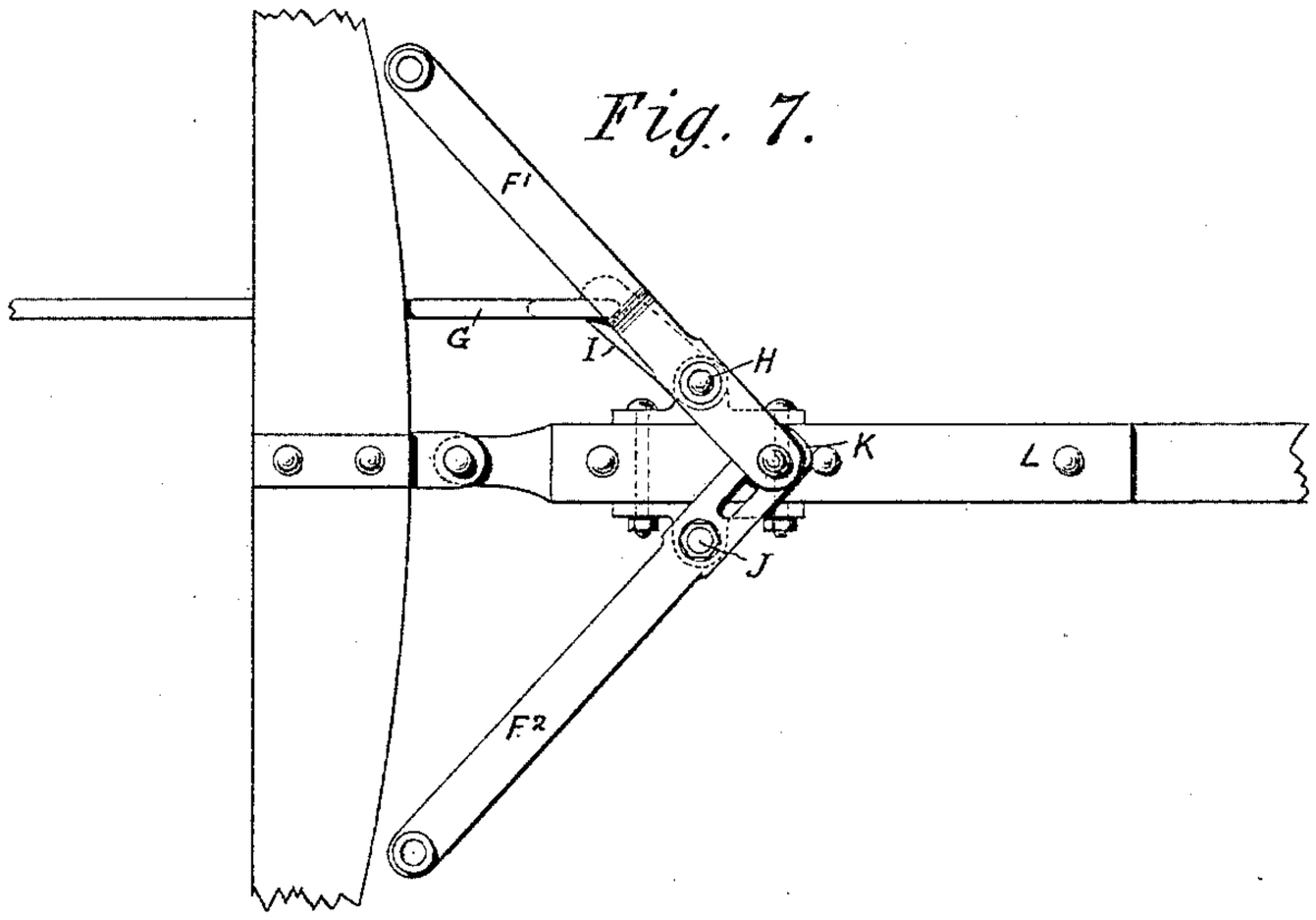


Fig. 7.



Witnesses

Robt. F. Drury

Bernard E. Drury

Inventors

James Leach

Walter V. Hirst

UNITED STATES PATENT OFFICE.

JAMES LEACH, OF SHEFFIELD, AND WALTER V. HIRST, OF ROTHERHAM, ENGLAND.

CAR-STARTER.

SPECIFICATION forming part of Letters Patent No. 437,698, dated October 7, 1890.

Application filed May 20, 1889. Serial No. 311,393. (No model.)

To all whom it may concern:

Be it known that we, JAMES LEACH and WALTER VIVIAN HIRST, residing, respectively, at Sheffield and at Rotherham, county of York, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Apparatus for Starting Tram-Cars and other Vehicles having Revolving Axles; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to certain improvements in apparatus to aid the horses in starting tram-cars or any vehicles having revolving wheel-axles; but it refers more particularly to tram-cars, the chief object being to relieve the horses from the sudden strain required to overcome the *vis inertiæ* of a stationary car. But we do not confine our invention to its application to vehicles drawn by cattle, as it may also be applied to other vehicles; and so that our invention may be clearly understood, we annex the sheets of drawings herewith, in which similar letters of reference indicate similar parts in any of the figures.

Figures 1 and 2 represent an elevation and plan of the apparatus as attached to one end of a single-horse tram-car, showing the position before starting; Figs. 3 and 4, an elevation and plan of same apparatus when the horse is drawing the car; Figs. 5, 6, and 7, front elevation, side elevation, and plan of apparatus as adapted for two horses.

In carrying our invention into effect as applied to a single-horse tram-car—for example, in the manner illustrated in Figs. 1 to 4, inclusive—the apparatus extends from the draw-bar, to which the trace-hook is attached, to the axle of the nearest pair of wheels, and it may be used at one end only or at both ends of the car. It consists of the following mechanical parts or their well-known equivalents, arranged in the manner as described: Upon the center or thereabout of the axle A of the wheels we fix securely a ratchet-wheel B of sufficient strength for the required purpose, and in connection with it and carried by a suitable frame-work or double arm C is a pivoted tumbler-catch D. The double arm C swings upon the axle A and extends from the axle in the opposite direction to carry a counter-weight E. The end of the arm which carries the tumbler-catch D is connected to the draw-bar F at the front of the car by a connecting-rod G or its equivalent, such as a chain, wire rope, or the like. The tumbler-catch D projects from each side of the arm C, and is provided with a hook that will engage with the teeth of the ratchet-wheel B when the arm C is drawn by the rod G toward the front of the car. The tail end of the said catch is formed to retain the hook of the catch out of gear with the wheel when it reaches a certain position.

The normal or resting position of the lever C and catch D when the car is stationary is with the tumbler-catch D behind the vertical center line of the axle A, as shown in Fig. 1, and the counter-weight E (by the gravity of which it is brought to this position) at the bottom or underneath. The hook of the tumbler-catch D will thus be held out of gear with the wheel by coming in contact with the rod G, which assumes a lower position after passing over the center of the axle A.

The draw-bar F is secured to the top of a vertical shaft H, having a shorter arm or lever I, into which the connecting-rod G is hooked, the whole being firmly secured to the front of the car in any convenient manner.

When the horse pulls at the draw-bar F in the position shown in Figs. 1 and 2 to start the car, the draw-bar F must assume the open position shown in Figs. 3 and 4 before the pull comes directly upon the car, and during this movement the short arm I is also drawn round from the position seen in Fig. 2 to that in Fig. 4. The rod G, which is hooked onto arm I, pulls forward the arm C, and is thereby raised sufficiently when it is over the center of the axle to allow the hook of the tumbler-catch D to drop into the teeth of the ratchet-wheel B. The continuation of the forward movement will turn round the axle and wheels and start the car with comparative ease, due to the increase of power obtained by the compound leverage in the various parts of the apparatus. When the draw-bar is in the position seen in Figs. 3 and 4 and the car run-

ning, the tumbler-catch by reason of its position and gravity disengages from the ratchet-wheel and falls back out of gear until the next stoppage, thus avoiding wear upon the teeth, and noise.

Instead of the counter-weight E, a spring may be substituted, being suitably placed to accomplish the desired return movement.

Figs. 5, 6, and 7 illustrate the manner of applying our invention to a two-horse car. The ratchet and frame-work upon the axle is the same as before described for a one-horse car, and the connecting-rod G is also attached to a similar short arm I and vertical rod H. Two draw-bars F′ and F² are used, the bar F′ being secured to the top of the vertical rod H, and the bar F² being pivoted upon a separate stud J. Both bars are connected at the short ends by means of a stud or bolt fixed in one of the bars, passing through a slot formed in the other bar, so that both bars must move simultaneously; but we may obtain this movement by lengthening the stud J and fixing upon it and upon the vertical rod H a pair of toothed segments gearing into each other or by any equivalent device. Thus by this arrangement the pull of each horse will act directly and simultaneously upon the short arm I and ratchet, starting motion. In this double-horse apparatus a convenient method of applying a spring motion in place of a counter-weight is to attach one end of a spiral or coiled spring to the ends of the draw-bars at K and the other to a stud at L.

If desirable to increase the power of the apparatus, intermediate gearing may be used in addition thereto. Details which have not been described may be of any approved description, and we do not limit our claims, as hereinafter stated, to any mechanical details which are not essential to the respective combinations.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In apparatus for starting tram-cars and other like vehicles having revolving axles, a pivoted tumbler-catch having a hook and a projecting tail at its respective ends, in combination with a ratchet-wheel fast on an axle of the vehicle, a catch carrying frame turning loosely upon the axle and extended radially beyond the pivot of the catch, and a connecting-rod coupled to the outer end of said frame and engaging directly with said tail of the tumbler-catch, substantially as hereinbefore specified.

2. The combination of a horizontally-swinging draw-bar, a short vertical shaft turned by the same and carrying a short lever-arm, fixed bearings for said shaft, a connecting-rod coupled to said arm, a frame turning loosely on the near axle and coupled to said rod, a pivoted tumbler-catch carried by said frame, and a ratchet-wheel fast on the axle, substantially as hereinbefore specified.

3. The horizontally-swinging two-horse draw-bars F′ F², coupled together at their inner ends, in combination with the short vertical shaft H, turned by said draw-bars and carrying the short lever-arm I, the pivot J, parallel with said shaft, fixed bearings for said shaft and pivot, a connecting-rod coupled to said arm, a frame turning loosely on the near axle and coupled to said rod, a pivoted tumbler-catch carried by said frame, and a ratchet-wheel fast on the axle, substantially as hereinbefore specified.

In testimony that we claim the foregoing as our own we have affixed hereto our signatures, in presence of two witnesses, this 11th day of April, 1889.

JAMES LEACH.
WALTER V. HIRST.

Witnesses:
ROBT. F. DRURY,
BERNARD E. DRURY.