

No. 618,225.

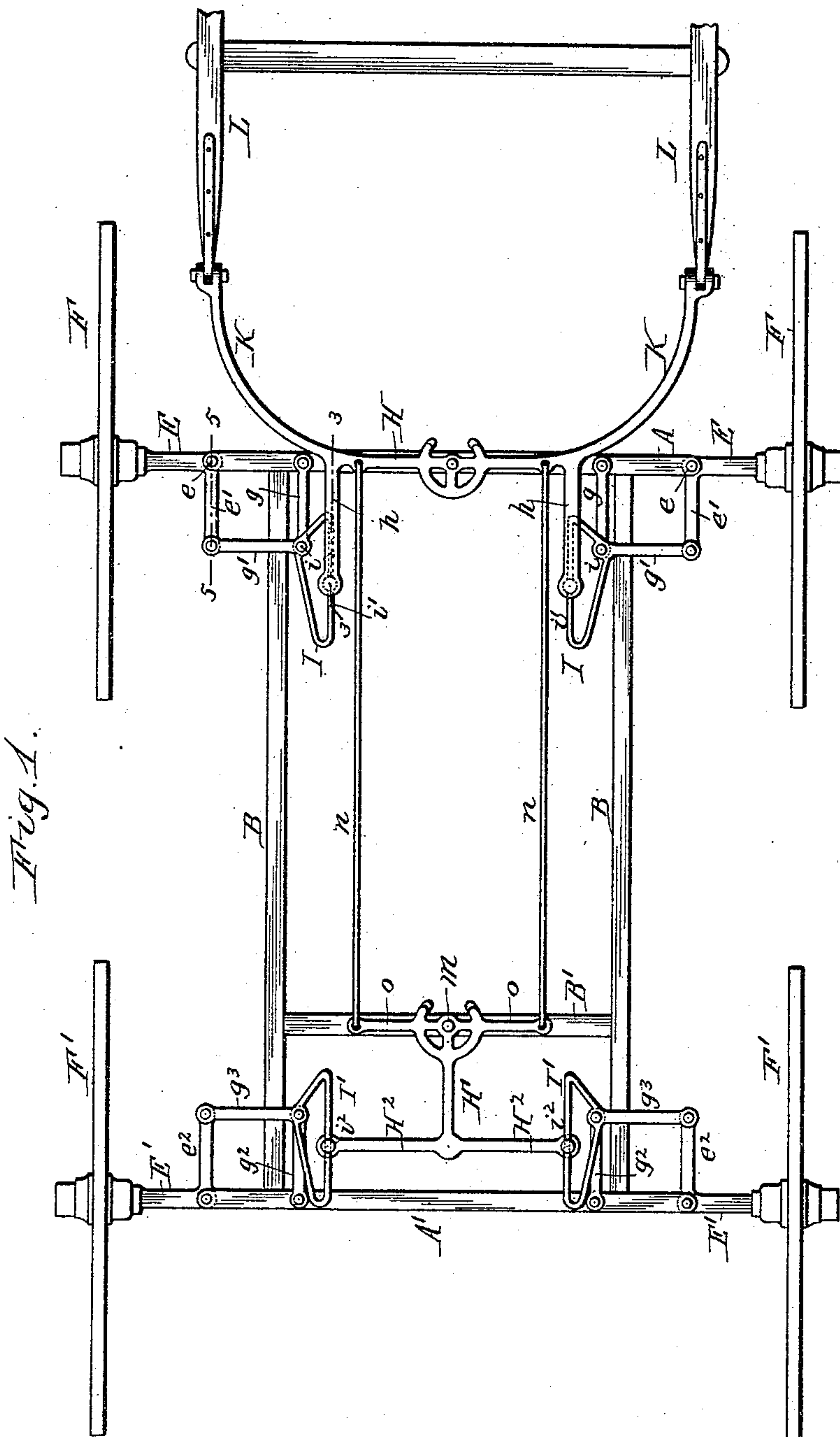
Patented Jan. 24, 1899.

F. V. GIFFORD.
RUNNING GEAR FOR VEHICLES.

(Application filed Oct. 29, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
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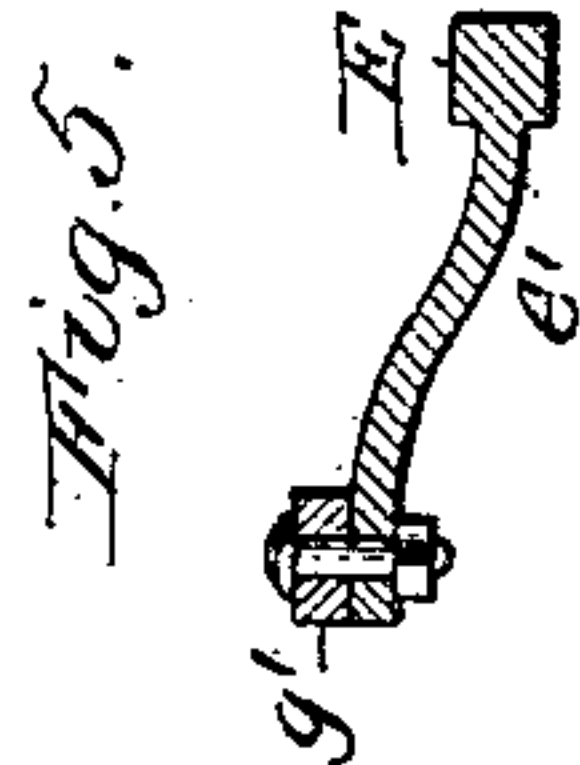
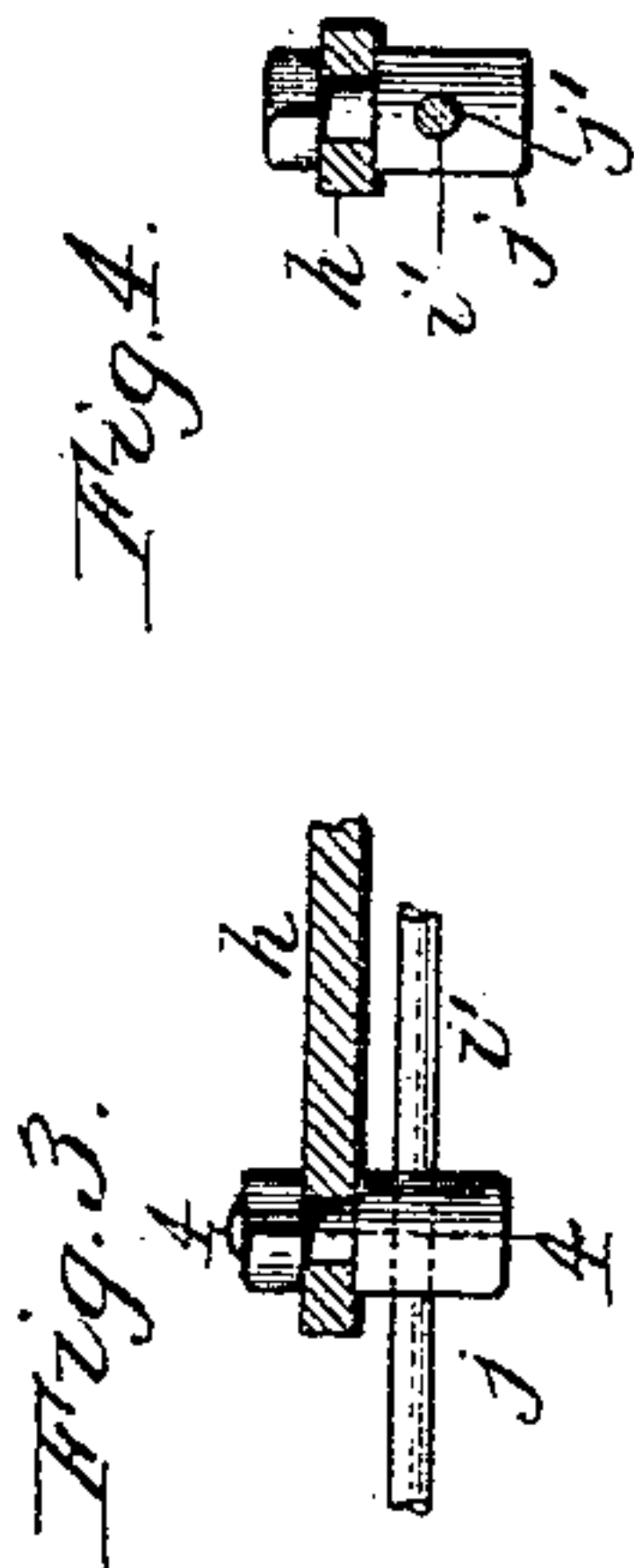
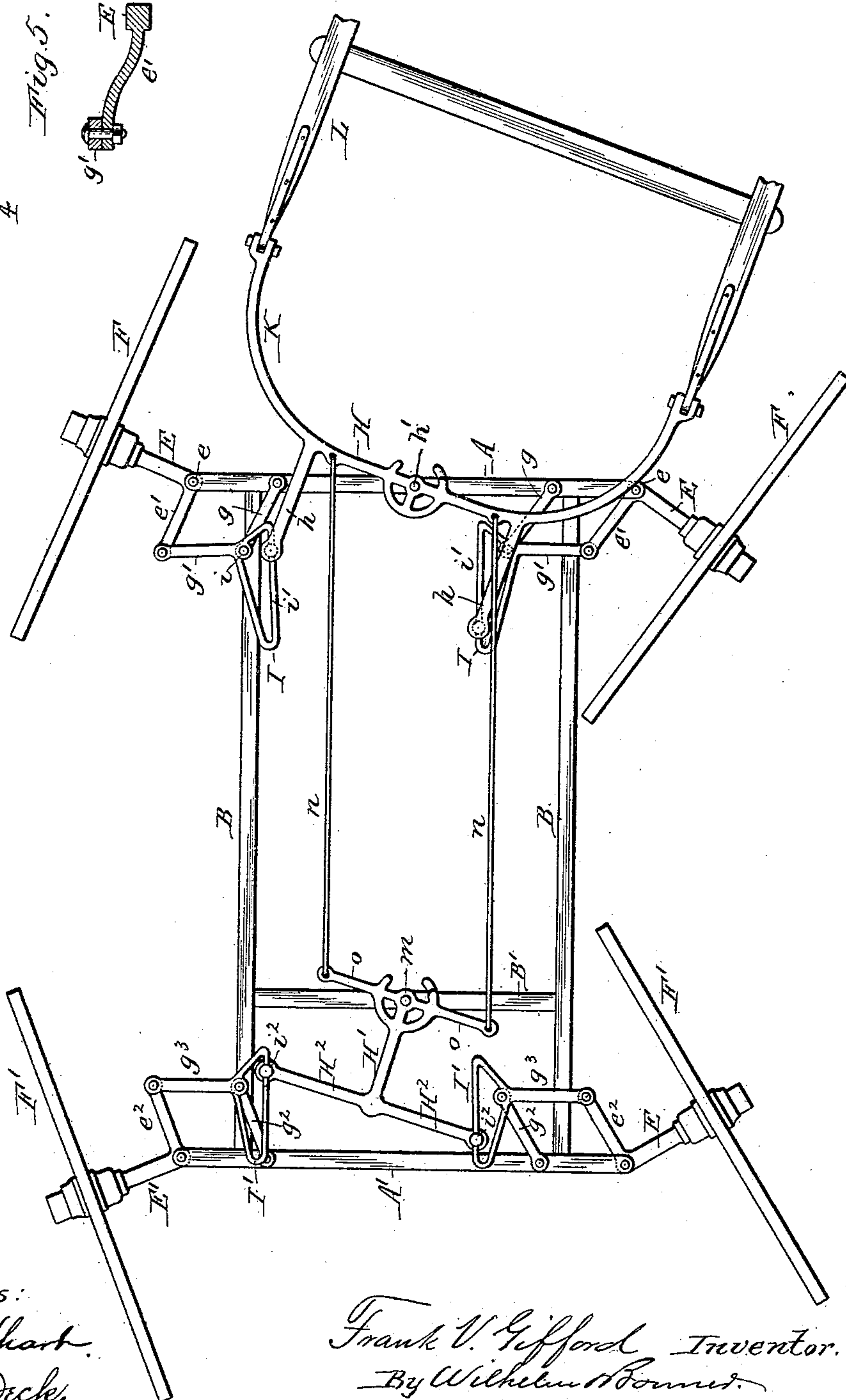


Fig. 2.



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UNITED STATES PATENT OFFICE.

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RUNNING-GEAR FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 618,225, dated January 24, 1899.

Application filed October 29, 1898. Serial No. 694,865. (No model.)

To all whom it may concern:

Be it known that I, FRANK V. GIFFORD, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented new and useful Improvements in Running-Gear for Vehicles, of which the following is a specification.

This invention relates to that class of short-turning vehicle-gears in which the axle-spindles are capable of swinging horizontally on the ends of the axle and connected with the tongue or the thills, so that the turning movement of the latter is transmitted to the spindles. To prevent crowding or dragging of the wheels in turning the vehicle, the spindle of the inner wheel should turn about its pivot through a somewhat greater arc than the spindle of the outer wheel, so that when the tongue stands at an angle to the longitudinal center line of the vehicle the planes of the two front wheels are not parallel, but converge rearwardly and preferably to such an extent that the wheels turn in circles described from approximately the same center.

The object of my invention is to produce an efficient running-gear which effects this differential adjustment of the wheel-spindles and in which the connections between the tongue and the spindles assume at all times such an angle to the spindle-arms as to afford an advantageous leverage for turning the vehicles from one position to another.

In the accompanying drawings, consisting of two sheets, Figure 1 is a bottom plan view of my improved running-gear, showing the wheels in their straight position. Fig. 2 is a similar view showing the position of the parts in turning the vehicle. Fig. 3 is an enlarged vertical longitudinal section of one of the sliding connections in line 3 3, Fig. 1. Fig. 4 is a vertical cross-section in line 4 4, Fig. 3. Fig. 5 is a longitudinal section, on an enlarged scale, of one of the spindles and connecting parts in line 5 5, Fig. 1.

Like letters of reference refer to like parts in the several figures.

A is the front axle; A', the rear axle; B, the side bars, and B' a cross-bar connecting the side bars.

The body of the vehicle is not shown in the drawings and may be of any ordinary construction.

E represents the spindles of the front axle, on which the front wheels F are mounted and which are pivoted to the ends of the axle by vertical pins or bolts *e*, so as to be capable of swinging horizontally on the axle. Each of these spindles is provided at its inner end with a rearwardly-projecting shifting arm *e'*, arranged substantially at right angles to the spindle.

g represents longitudinal arms or links arranged on the inner side of the spindle-arms *e'* and each pivoted at its front end to the front axle by a vertical bolt and having its rear end connected with the rear end of the adjacent spindle-arm by a transverse link *g'*. The spindle-arms and the longitudinal links *g* are of the same length, so that the transverse links *g'* remain substantially parallel with the front axle in all positions of the wheels.

H is a transverse steering bar or head pivoted centrally to the middle of the front axle by a vertical bolt *h'*, so as to be capable of swinging horizontally and provided on opposite sides of its pivot and equidistant therefrom with rigid rearwardly-extending arms *h*. The rear ends of these arms are connected with the transverse links or connections *g'* by connecting-frames I, so that the lateral movement of said arms, due to the turning of the steering-head, is transmitted to the wheel-spindles through said links and the shifting arms *e'* of the spindles. These connecting-frames I are preferably of elongated triangular form and are rigidly secured at their outer angles *i* to the transverse connecting-links *g'*, so that the frames while capable of moving laterally with said links always remain substantially at right angles to the front axle. The arms *h* of the steering-head have a combined sliding and pivotal connection with the inner longitudinal bars *i'* of the frames I, so that when the steering-head is turned out of line with the front axle its arms slide in opposite directions on said bars and the rear ends of the arms are at the same time permitted to swivel on the frames to prevent binding of the parts on each other. The connection shown in the drawings consists of a vertical stud or pin *j*, capable of turning freely in an opening of the steering-arm *h*, and having a horizontal opening *j'*, through which the

longitudinal or guide member of the connecting-frame passes loosely, as shown in Figs. 3 and 4.

K represents arms which extend forwardly from the steering-head and to which the thills L or the tongue is attached, as the case may be.

Upon swinging the steering-head on its pivot the two points of attachment of its arms h with the connecting-frames I swing in arcs concentric with the pivot of the steering-head and in the same general direction, but in somewhat different directions with reference to the front axle and its spindles. The point of attachment which controls the spindle of the outer wheel swings more in a transverse direction, while that which controls the spindle of the outer wheel swings more in a longitudinal direction, so that the spindle of the inner wheel is turned through a greater arc about its pivot than is the spindle of the outer wheel. This throws the two wheels out of parallelism in turning the thills or pole and places the front wheels in positions in which their planes converge rearwardly, as shown in Fig. 2. By this construction when the vehicle is turned the transverse shifting link g' , connected with the inner-wheel spindle, remains at a considerable angle to the shifting arm of said spindle, even when the wheel is turned inward to its extreme limit, as shown in Fig. 2, thus obtaining a favorable leverage for returning the wheels to their straight position.

The spindles E' of the rear wheels F' are preferably adjusted in a similar manner and from the front steering-head, although this adjustment of the rear wheels is not indispensable.

The parts whereby the rear-wheel spindles are adjusted are constructed as follows: These spindles are pivoted to the ends of the axle in the same manner as those of the front wheels, and each is provided at its inner end with a forwardly-projecting shifting arm e^2 , arranged substantially at right angles to the spindle. g^2 represents the links, similar to the links g , which are arranged parallel with the shifting arms of the spindles and on the front side of the rear axle. g^3 are the transverse links connecting the spindle-arms and the longitudinal links g^2 , and I' are connecting-frames secured to said transverse links. H' is a rear T-shaped steering-head pivoted at its front end to the middle of the cross-bar B' by a vertical pin m and having at its rear end a cross-bar H^2 . The outer ends of this cross-bar are connected with the longitudinal members of the frames I' by sliding and swiveling connections v^2 , similar to the corresponding connections of the front steering-head, by which construction and arrangement of parts a differential adjustment of the rear wheels is effected corresponding to that of the front wheels. The rear steering-head is actuated from the front steering-head by longitudinal connecting-rods n , attached at their front ends to the front steering-head on oppo-

site sides of its pivot and at their rear ends to arms o , extending laterally in opposite directions from the pivoted front end of the rear steering-head.

In order to obtain a suitable differential turn of the wheels, the arms h of the front steering-head and the arms H^2 of the rear steering-head should be somewhat longer than the shifting arms of the wheel-spindles—say about one-fourth longer than said spindle-arms—as shown in the drawings.

I claim as my invention—

1. The combination with an axle, of wheel-spindles connected with the ends thereof by vertical pivots and each having a shifting arm arranged substantially at right angles thereto, a steering-head pivoted in the longitudinal center line of the vehicle and provided on opposite sides of said line with laterally-extending arms, guides or frames arranged substantially at right angles to the axle and connected with said spindle-arms, respectively, and sliding connections which transmit the movement of the steering-head to said guides or frames, substantially as set forth.

2. The combination with an axle, of wheel-spindles connected with the ends thereof by vertical pivots and each having a shifting arm arranged substantially at right angles thereto, longitudinal arms or links pivoted to the axle on the inner side of the shifting arms of the wheel-spindles and arranged on the same side of the axle as said arms, transverse links connecting said shifting arms with said longitudinal links, guides or frames rigidly connected with said transverse links and arranged substantially at right angles to the axle, a steering-head pivoted in the longitudinal center line of the vehicle and provided on opposite sides of said line with laterally-extending arms, and sliding connections which transmit the movement of said steering-arms to said guides or frames, substantially as set forth.

3. The combination with the front axle and the wheel-spindles connected with the ends thereof by vertical pivots and having rearwardly-projecting arms, of longitudinal guide bars or frames arranged on the rear side of the axle and connected with the arms of said spindles, so as to move laterally therewith, and a steering-head pivoted to the middle of the axle and provided on opposite sides of its pivot with arms having a sliding and swiveling connection with said longitudinal guide bars or frames, substantially as set forth.

4. The combination with the front axle and the wheel-spindles connected with the ends thereof by vertical pivots and having rearwardly-projecting arms, longitudinal arms or links extending rearwardly from the axle and arranged on the inner side of said spindle-arms, transverse links connecting said spindle-arms with said longitudinal links, guides or frames rigidly connected with said transverse links and arranged substantially at

right angles to the axle, a steering-head pivoted to the middle of the axle and provided on opposite sides of its pivot with rearwardly-extending arms and sliding connections between said arms and said guides or frames, substantially as set forth.

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