No. 778,722. PATENTED DEC. 27, 1904.

G. THORET.

LOCOMOTIVE.

APPLICATION FILED APR. 22, 1902.

2 SHEETS—SHEET 1.

Fig. 1

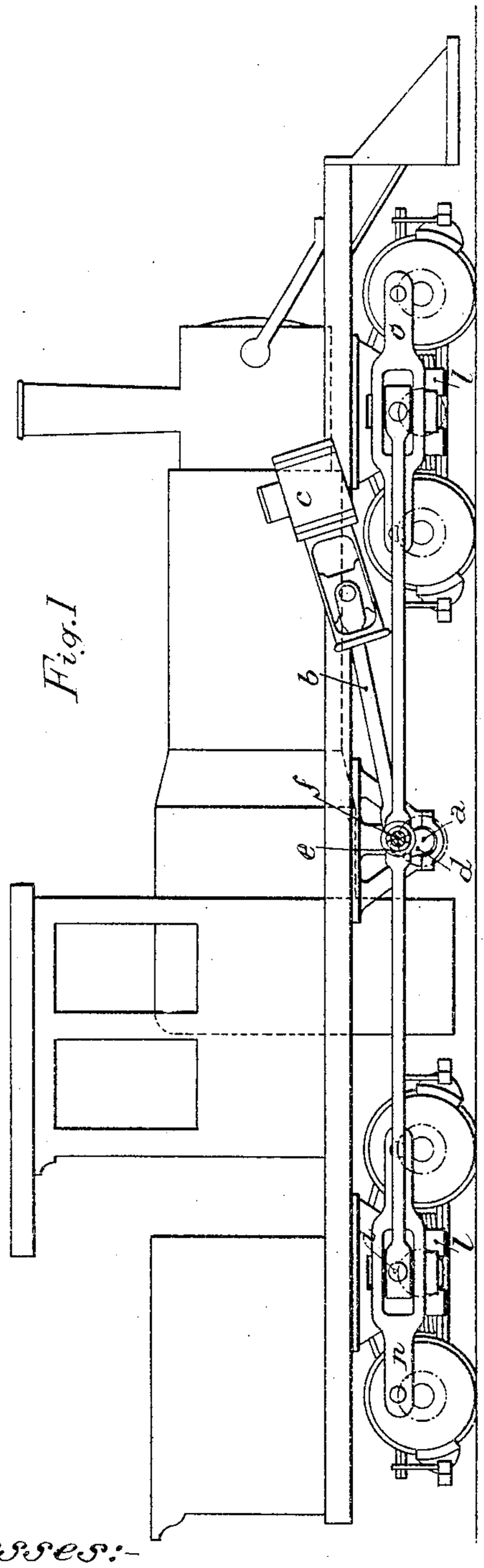
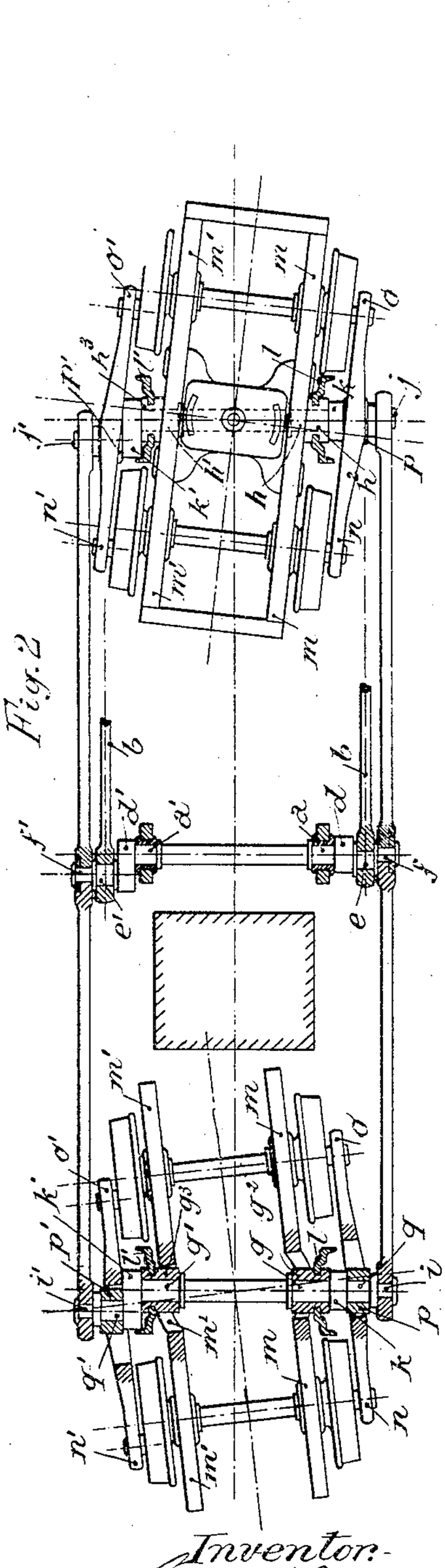


Fig. 2



Witnesses:-
Henry Thieme
George Barry Jr

Inventor:-
Gaston Thoret
by attorneys
Brown & Seward

No. 778,722. PATENTED DEC. 27, 1904.

G. THORET.

LOCOMOTIVE.

APPLICATION FILED APR. 22, 1902.

2 SHEETS—SHEET 2.

Fig. 3.

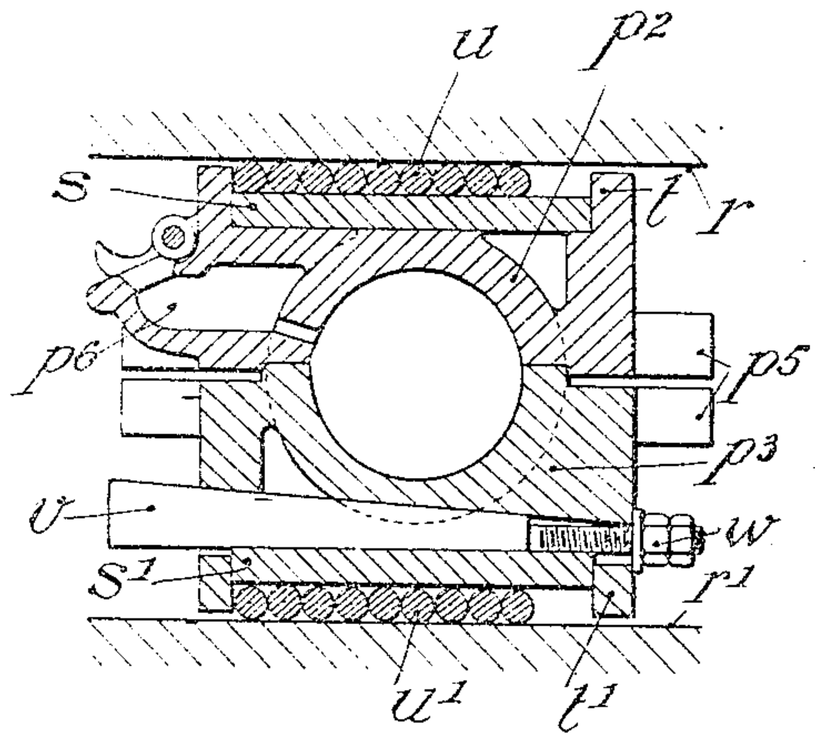


Fig. 4.

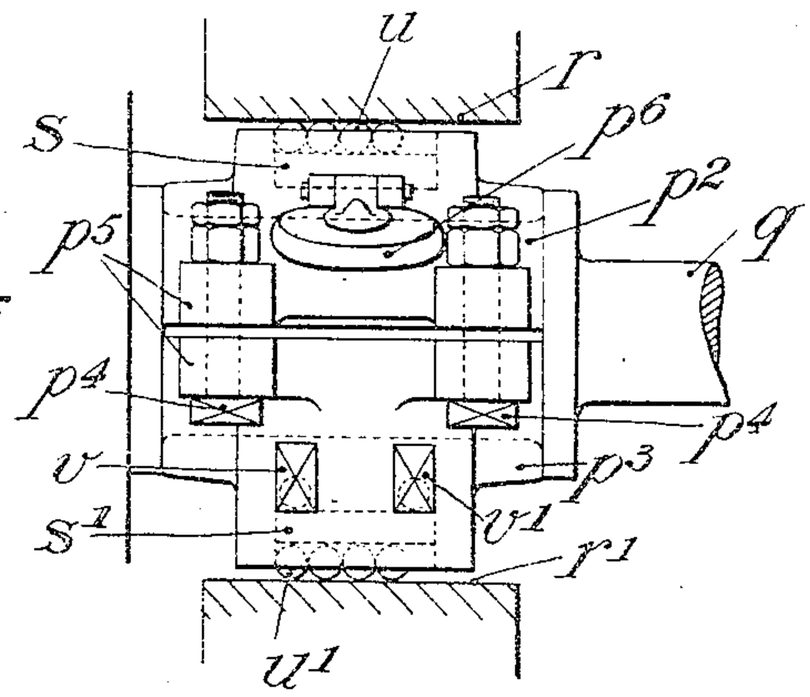
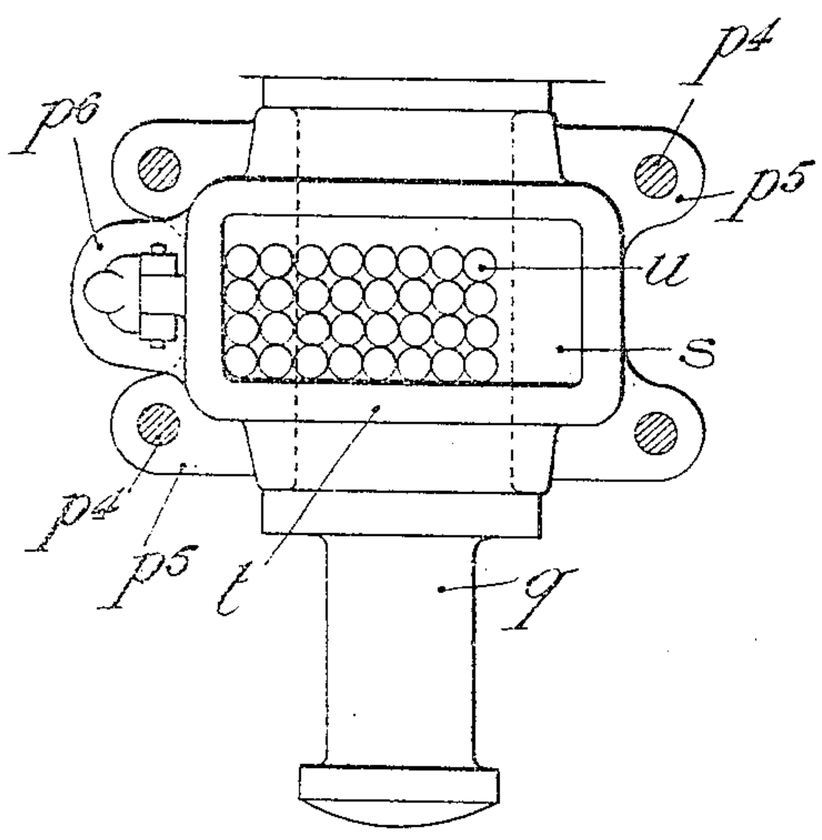


Fig. 5.



Witnesses:
F. G. Hachmberg.
Henry Thieme.

Inventor:
Gaston Thoret
by attorneys
Prouty & Seward

No. 778,722. Patented December 27, 1904.

UNITED STATES PATENT OFFICE.

GASTON THORET, OF PARIS, FRANCE.

LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 778,722, dated December 27, 1904.

Application filed April 22, 1902. Serial No. 104,135.

To all whom it may concern:

Be it known that I, GASTON THORET, engineer, a citizen of the Republic of France, and a resident of 36 Rue de Washington, Paris, France, have invented new and useful Improvements in Locomotives, of which the following is a specification.

My invention relates to a system of supporting locomotives upon two trucks or bogies with four wheels of the American type, the eight wheels being all of them driving. The adherent weight, which thus becomes the total weight of the machine and its tender, is distributed over each of the bogies, whence results a much greater tractive force of the locomotive, the adherent weight being the most important factor of the power of which such a machine is capable. Further, besides my arrangement insuring perfect liberty for rounding curves even of the shortest radius (the two bogies being organized for taking any mutual displacement with regard to each other which the line requires) my method of suspension permits the employment of a very wide fire-box, which is also a greater factor in the actual power of the machine.

The accompanying drawings illustrate a method of carrying my invention into effect.

Figure 1 is an elevation and Fig. 2 a horizontal section on the left hand through the axis of the shafts and on the right hand above the bogies; Fig. 3, a vertical longitudinal section; Fig. 4, a side view; and Fig. 5, a plan of a crank-pin box, which will be hereinafter described.

The system comprises a central driving-shaft $a\ a'$, carried in bearings fitted to the main frame and actuated through connecting-rods $b\ b'$ by the steam-cylinders, which may, as shown in the accompanying drawings, be situated as shown at c and symmetrically on the other side of the tubular boiler. The crank-pins $e\ e'$ of the cranks $d\ d'$, actuated by the connecting-rods $b\ b'$, are extended to form additional pins $f\ f'$, eccentric to the first ones if the cylinders are inclined or in the same axis if they are horizontal. It is these pins $f\ f'$ which actuate the main connecting or coupling rods, which in their turn transmit the motion to the secondary driving-shafts $g\ g'$ and $h\ h'$ of each truck by their action upon the pins $i\ i'$ and $j\ j'$ of the cranks $k\ k'$.

The secondary shafts $g\ g'$ and $h\ h'$ are situated in the center of each bogie, and their bearings $g^2\ g^3$ and $h^2\ h^3$ can move vertically in the slides $l\ l'$, fixed to the cheeks of the main frame of the locomotive, thus permitting of the independent vertical movements of the trucks in relation to the locomotive. These same bearings are carried by beams $m\ m'$ of the trucks, they being located in horizontal slides formed in said beams and along which they freely move. The vertical slides $l\ l'$, the bearings, and the beams are of such form that they permit of all relative displacements for passing round curves. For this reason the slides in the beams in plan have a curvilinear form, which necessitates a corresponding form of the slide-blocks in order to avoid the tail motion, which the lateral displacement would not fail to produce if this were not provided for. This special suspension has the effect that the two shafts do not participate either, as we have above stated, in the oscillations which the main frame may experience nor in the turning movement of the trucks or undercarriages and that they are invariably situated in a plane which passes through the wheel-axles of each truck while still remaining parallel to the shaft $a\ a'$, in the horizontal plane of which they have been mounted. They are therefore the slides in the beams which are movable, the slide-blocks remaining in position. It is to be noticed, further, that the principal coupling-links are set at ninety degrees.

The two axles of each truck are themselves coupled by secondary connecting-rods $n\ o$ and $n'\ o'$, also set at ninety degrees. Similarly to the beams the center part of these connecting-rods is slotted in the form of horizontal slides, so as to always allow of the free oscillation of the bogies for following the curvature of the track. These secondary connecting-rods nevertheless at all times and in all positions receive the impulse communicated by the principal connecting-rods to the crank-pins $i\ i'$ and $j\ j'$ and thence through the secondary crank-pins $q\ q'$, forming a continuation of the former to the sliding bearings $p\ p'$. In

this manner a continuous movement is communicated to the wheels of the machine. In fact, the horizontal push always exercised by one or other of the main connecting-rods either upon the pin i or pin i' of the shaft $g\ g$, as well as on the corresponding pin j or j'' of the shaft $h\ h'$, is translated by a vertical push of the pin q' or q upon the secondary connecting-rod $n'\ o'$ or $n\ o$, as well as on the corresponding secondary connecting-rod of the other bogie and as the two crank-pins on each shaft and axle are set at ninety degrees to each other.

The slide-blocks and slides should allow of the displacements being as easy as possible, and this may be facilitated by employing an arrangement of steel balls on the two faces of the slide-blocks.

As illustrated in Figs. 4, 5, 6, the slide-block is represented as consisting, essentially, of a bearing-box for the reception of the crank-pin q or q', a pair of wedge-formed keys $v\ v'$, and a system of antifriction-balls $u\ u'$. The box comprises two pieces $p^2\ p^3$, which contain each a half of the bearing and are united by bolts p^4, passing through lugs p^5, projecting from them. The upper one of said pieces contains a grease-box p^6. These bearing-boxes—that is to say, the faces of the two constituent pieces $p^2\ p^3$, which are situated between the cheeks $r\ r'$ of the slides of the secondary connecting-rods—are formed with cavities for the reception of the balls and of plates $s\ s'$, one, s, of which rests upon the bottom of the cavity, with which it corresponds, and the other, s', of which has its bearing on one of the faces of the keys $v\ v'$, of which the other face is inclined. The balls are placed between the plates s', and the cheeks $r\ r'$ of the slides and are retained by the borders $t\ t'$ of the cavities in the upper and lower parts of the box. Screws $w\ w'$ applied to the keys $v\ v'$ provide for the adjustment of the boxes to run easily in the slides.

It is advisable to provide a system of adjustment for taking up play which will enable the relative position of the shafts and wheels of the bogies being rigorously maintained.

The invention results in the following distinct advantages: A notable increase in the adherent weight, and consequently in the power of the machine, the entire locomotive and its tender resting solely on motor or driving wheels; perfect freedom in the passage over any curves, owing to the mutual displacement which the two trucks or undercarriages may assume, an arrangement which possesses the further advantage of producing much less wear and tear of the track than in systems hitherto employed; the facility of enabling a very wide fire-box and a very long tubular boiler to be employed, hence an increase in the actual power of the machine; simplicity of construction, with the facility of arranging all the parts outside, thus simplifying inspection and attention, and, finally, the facility of fitting the locomotive with wheels of any dimensions and of making same for any gage of track. For a narrow gage the wheels of the trucks or undercarriages will preferably be placed inside the beams, which will necessitate a crank at both ends of each axle for the coupling-rods, but will still allow of a very wide fire-box.

I claim—

A locomotive mounted on two bogies and comprising in combination a motor and a central shaft driven thereby, two secondary shafts free to slide vertically and remaining always in vertical planes parallel to the said central shaft and in the plane of the axles of the bogie to which each of them belongs, cranks at ninety degrees to each other on said central shaft and on each of said secondary shafts, principal connecting-rods between the cranks of said central shaft and those on the secondary shafts for communicating motion from the central shaft to the secondary shafts, cranks on each bogie-axle set at ninety degrees to each other, slotted secondary connecting-rods between the cranks of the bogie-axles for communicating motion from the cranks of the secondary shafts to the cranks of the bogie-axles, and bearing-boxes for the crank-pins of the secondary shafts running in the slots of the secondary connecting-rods, substantially as herein described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 1st day of November, 1901.

GASTON THORET.

Witnesses:
M. CARRABA,
ANSCLO AVILA.