3 Sheets--Sheet 1.

J. GRANTHAM.

Steam-Carriages for Tramways.

No. 142,459. Patented September 2, 1873.

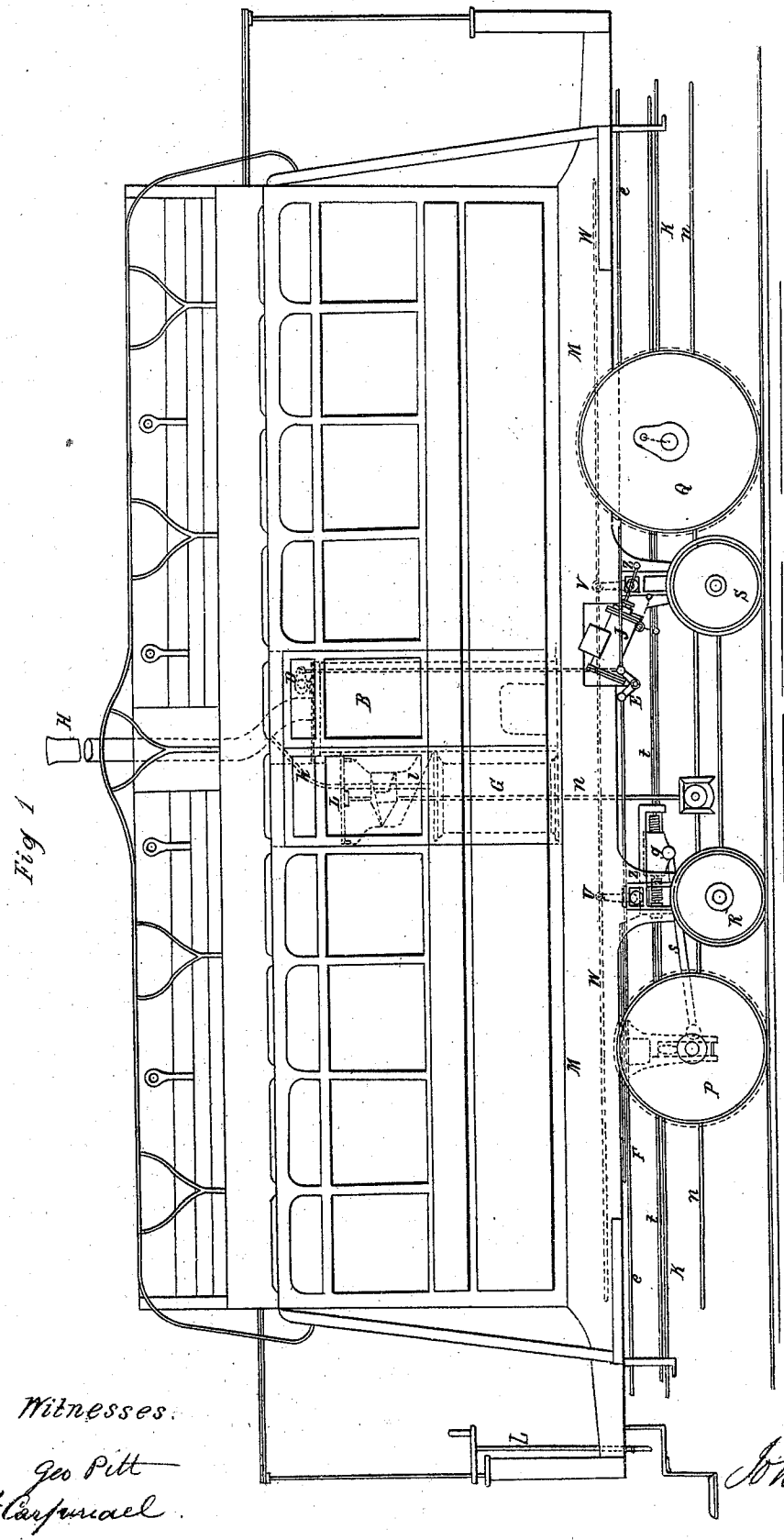

Fig 1

Witnesses.

Geo Pitt

D'Carfuraell.

Inventor.

John Grantham

3 Sheets--Sheet 2.

J. GRANTHAM.

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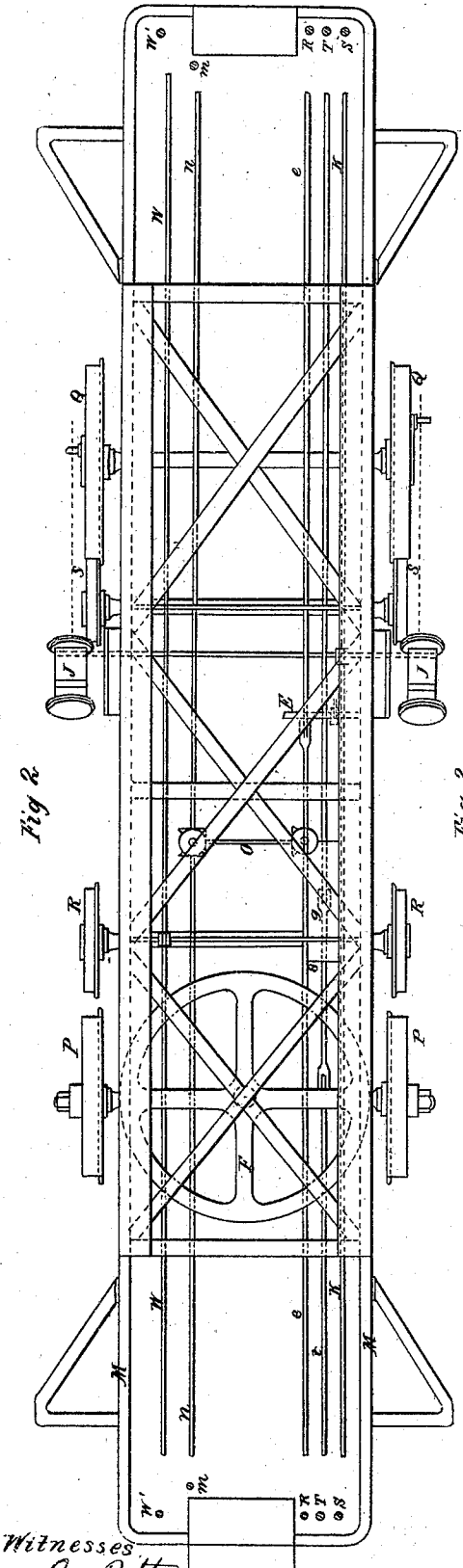

Fig 2

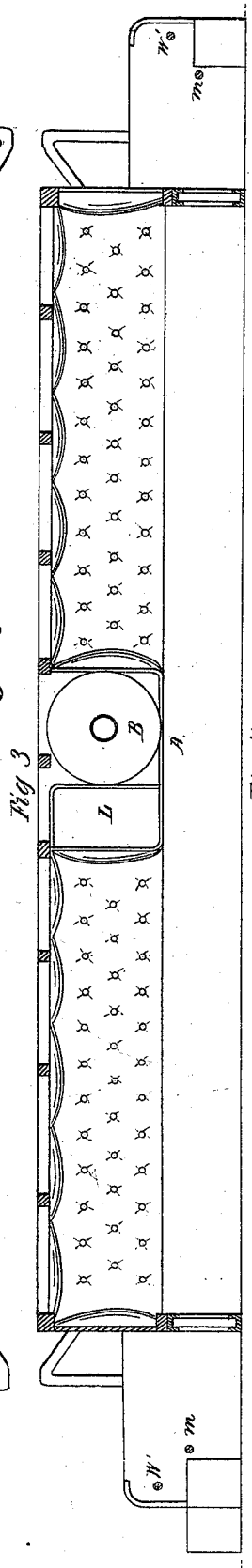

Fig 3

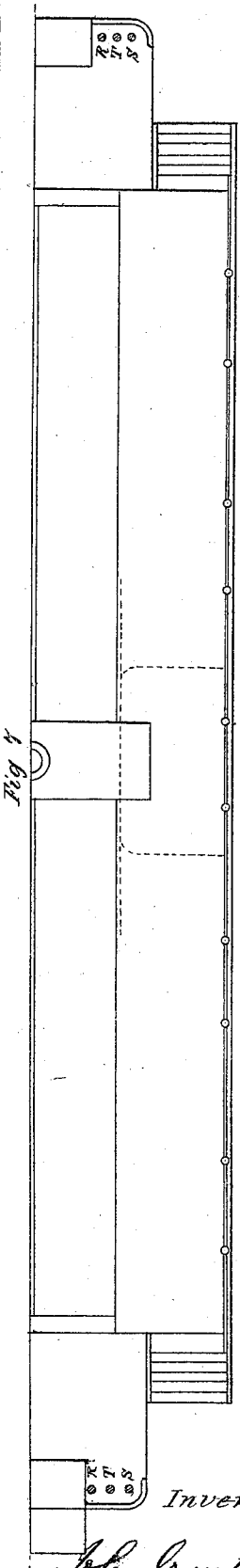

Fig 4

Witnesses
Geo. Pitt
D. Chipmael

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John Grantham

3 Sheets--Sheet 3.

J. GRANTHAM.

Steam-Carriages for Tramways.

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Fig 5.

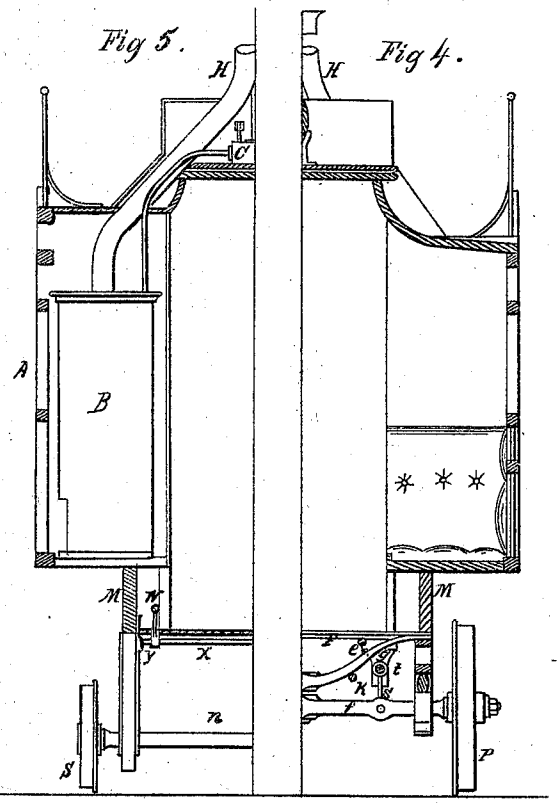
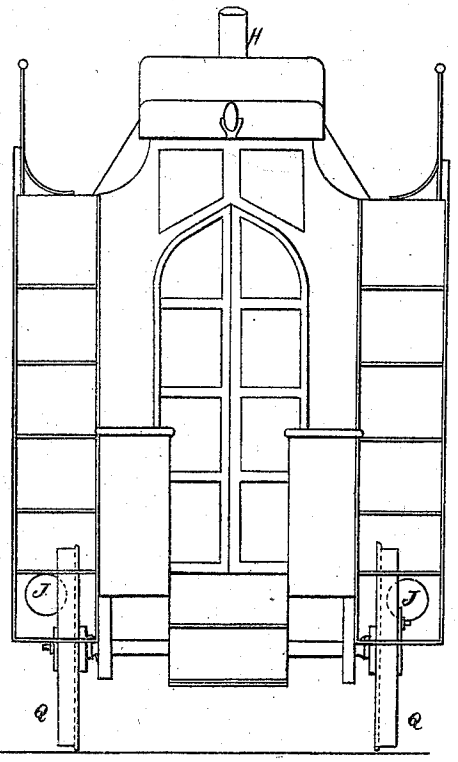


Fig 4.

Fig 6.



Witnesses.
Geo. Pitt
H. Carpmael.

Inventor.
John Grantham

UNITED STATES PATENT OFFICE.

JOHN GRANTHAM, OF LONDON, ENGLAND.

IMPROVEMENT IN STEAM-CARRIAGES FOR TRAM-WAYS.

Specification forming part of Letters Patent No. **142,459**, dated September 2, 1873; application filed November 2, 1872.

To all whom it may concern:

Be it known that I, JOHN GRANTHAM, of King's Arms Yard, in the city of London, England, am in possession of an invention for Improvements in Steam-Carriages for Tram-Ways; and I, the said JOHN GRANTHAM, do hereby declare the nature of my said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement—that is to say:

My invention consists in an improved steam-carriage adapted to carrying passengers on tram-ways. The carriage I employ is made of the form and in the manner generally adopted for carrying passengers on tram-ways in towns and other populous places, but to be worked by steam instead of by horses. To accomplish this I place the machinery in a chamber on each side of the carriage, as shown in the plans, but so as to preserve a passage through the carriage. I prefer placing these chambers in the center of length of the carriage, but they may also be placed nearer to either end. These chambers may contain one or two boilers, water-tank, and coal-box—the fires fed by machinery, as hereafter described. A double casing or air-space may be made round these chambers, and other means taken to prevent radiation of heat into the carriages.

It may be convenient here to describe how the carriage and machinery will be worked, as the object and uses of the several parts will then be better understood. The man who works the carriage, and whom I will call the engineer, will stand on the platform, which is, for the time, the front end, and where the driver now stands; to the same place will be led the various shafts and handles required for working the engines and boilers. When the carriage travels the reverse way the engineer, having disengaged these handles, goes to the other end, where there are corresponding handles, which, being thrown into gear, enable him to work the engines, as before. The brake is worked as at present.

These arrangements are shown in Sheets 1 and 2, and are represented by Figures 1, 2, 3, 4, 5, 6, 7. Fig. 1 is the elevation showing the boiler and machinery, part in dotted lines. Fig. 2 is a plan, showing the under frame of the carriage, with the position of the wheels; also, the rods for working the engines, boilers, and fore-body of carriage. Fig. 3, half-plan, showing the interior of the carriage, with the chambers A for the boilers B, if two are used. Fig. 4 is a half-section through the passenger department and the fore-body of the carriage. Fig. 5 is a half-section through the boiler-chambers. Fig. 6 is an end view; Fig. 7, half-plan of the top of the carriage.

These, being plainly shown in the drawings, do not require to be more particularly described, a few references to special portions of the machinery only being necessary. The boilers B are united by the steam-pipes *b* attached to the box C, which contains two safety-valves. On one of these pipes is the steam-cock D, which is connected by a rod and levers to the shaft E, with rods *e* leading to the ends of platform at R, where the engineer stands. The waste steam is led from each cylinder into the water-cisterns G. After this it passes into the funnel H through the pipe *h*. The cylinders J are attached to the frame M of the carriage, and are worked in the usual manner, with connecting-rods, cranks, eccentrics, drag-links, and valve-gear, the rod K leading to each platform at S being the means by which the valves are moved and the engines reversed. The coal-boxes L are connected with the boilers, and are formed as shown in Figs. 1 and 3. At the bottoms are placed large spirals, which, being turned, allow the fuel to fall down the chute *l* into the furnace through holes in the sides of the boilers leading to the furnaces. The spirals are set in motion by the rods and shafts marked, respectively, *n o*. The handles *m* on the platform are worked by the engineer when the fires require to be supplied, and give motion to the levers and shafts above named.

In forming the carriage the longitudinal frames M are placed inside the wheels, and are made of wood or iron.

In the above specification I have not described the details or the particular form of boilers I employ, or other parts of the steam-engine, rods, levers, or handles for the use of the engineer in controlling the carriage, as several arrangements may be adapted to this purpose; and it will be obvious, also, that many

other forms may be given to the carriage itself. The wheels P Q, in my first arrangement, are those usually adopted in tram-way carriages, and to the latter of which I apply the engine-power. These usually have flanges, as shown by the dotted lines, by which the carriage is kept on the rails.

I claim as my invention—

1. The arrangement of the boilers and their appurtenances in chambers at the opposite sides of the central passage-way of the carriage, so that a clear passage-way from end to end of the carriage is afforded, notwithstanding the presence of the boilers and their appurtenances within said carriage, substantially as before set forth.

2. The combination and arrangement of the coal-feeder for the boiler, the end platform of the carriage, the handle for controlling said coal-feeder, and the rod extending from said handle to the coal-feeder, whereby the engineer, while on the front platform, can control the supply of coal to the boiler in his rear within the carriage, substantially as before set forth.

JOHN GRANTHAM.

Witnesses:

WILMER M. HARRIS,

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Both of No. 17 *Gracechurch street, London, Notarial Clerks.*