

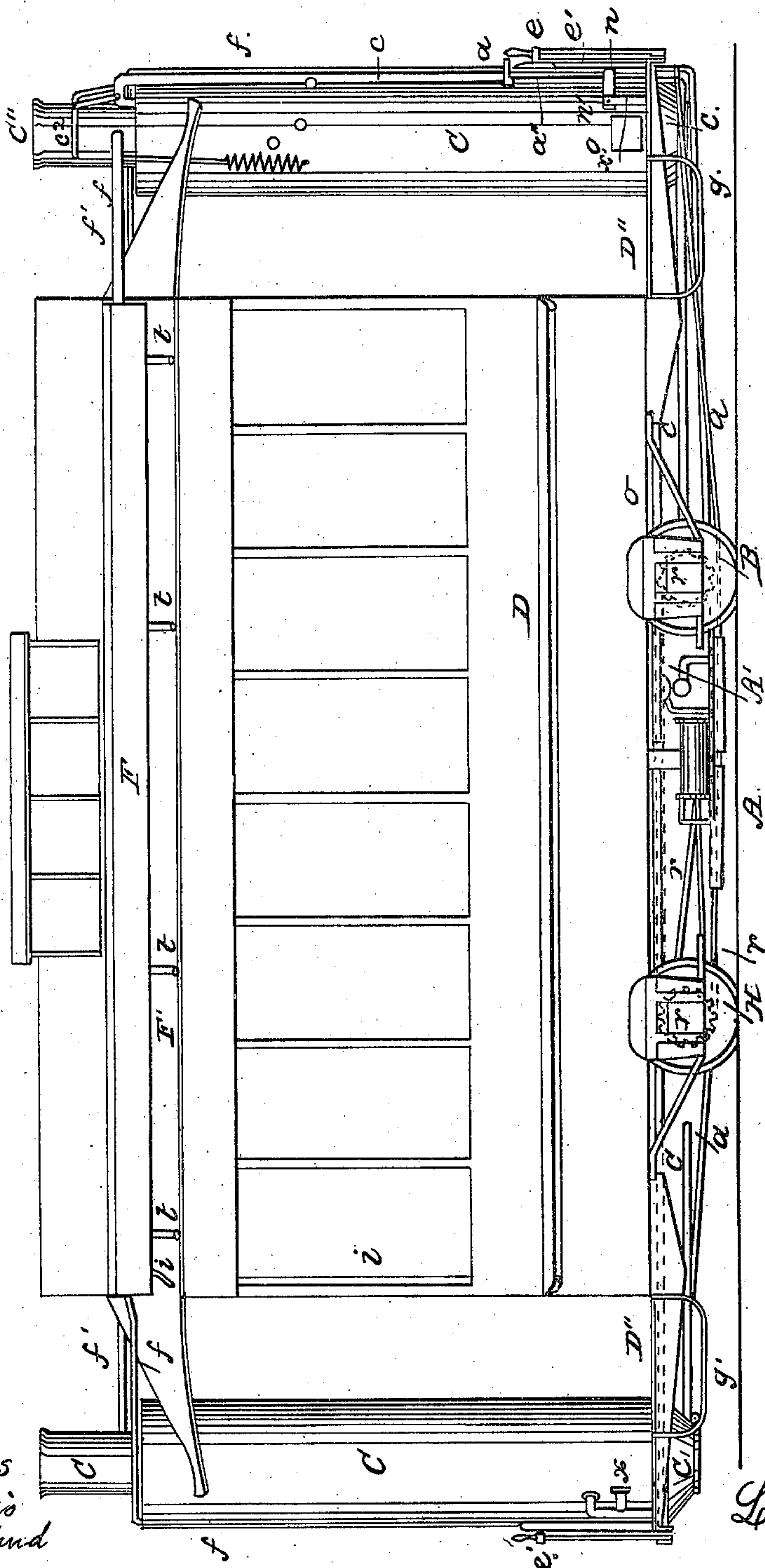
L. W. LANGDON.  
Railway Dummy.

3 Sheets—Sheet 1.

No. 97,300.

Patented Nov. 30, 1869.

Fig 1.



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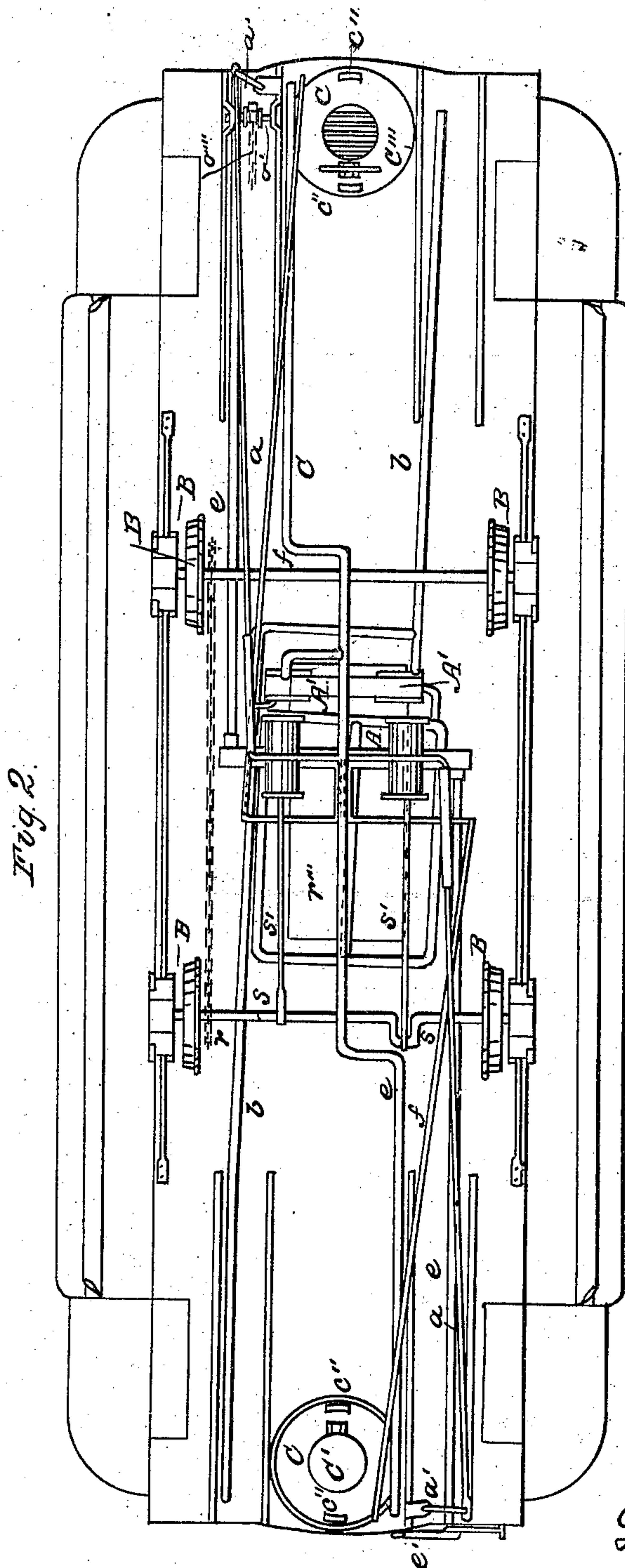
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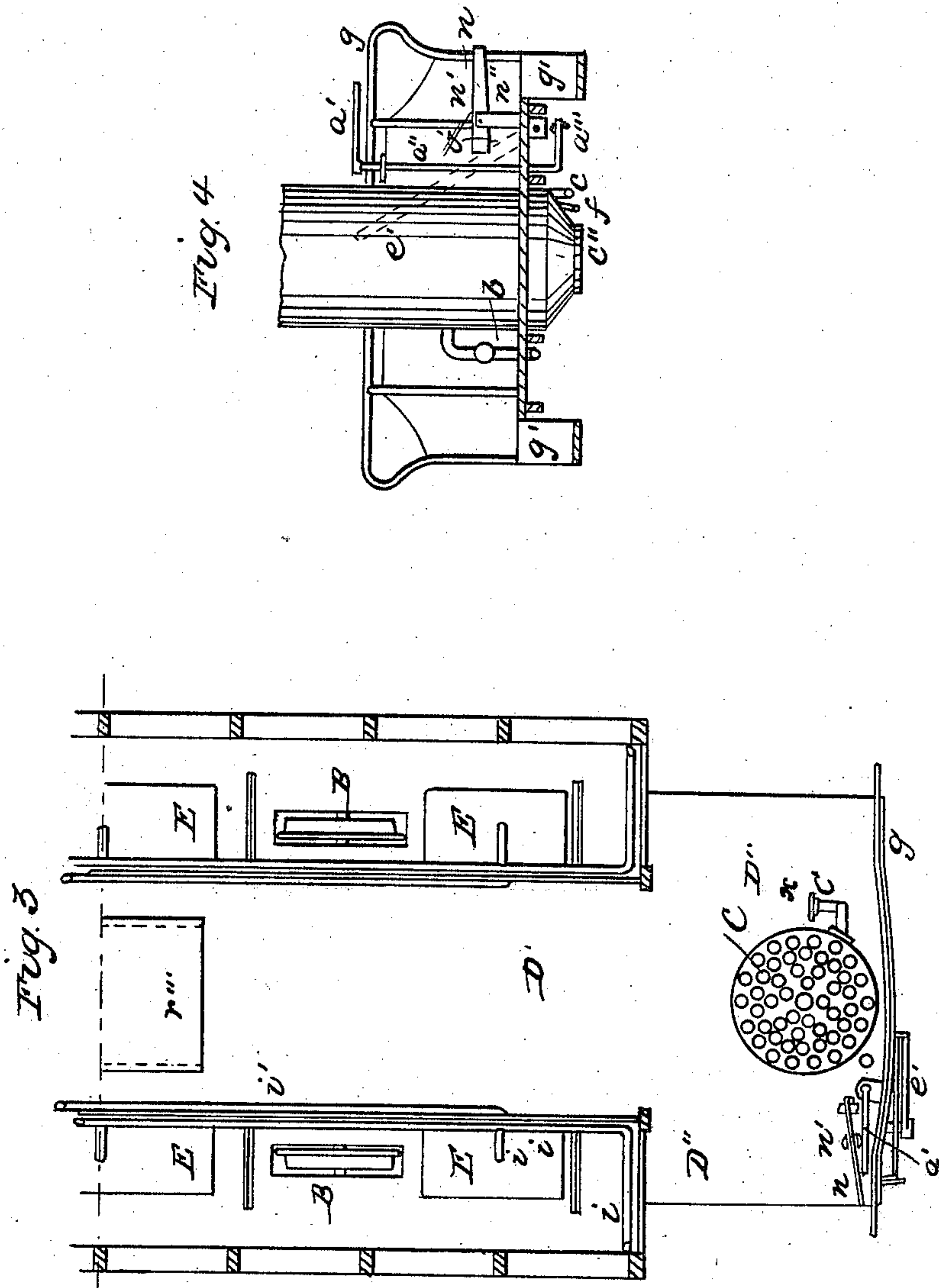
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# United States Patent Office.

LEANDER W. LANGDON, OF NORTHAMPTON, MASSACHUSETTS.

*Letters Patent No. 97,300, dated November 30, 1869.*

## IMPROVEMENT IN APPLYING STEAM-POWER TO STREET-RAILWAY CARS.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern:*

Be it known that I, LEANDER W. LANGDON, of Northampton, in the county of Hampshire, and State of Massachusetts, have invented a new and useful Improvement in Applying Steam-Power to Street-Railway Cars; and I do hereby declare the following, when taken in connection with the accompanying drawings, and the letters of reference marked thereon, to be a full, clear, and exact description thereof, and which said drawings constitute part of this specification, and represent in—

Figure 1, a side view of a street-railway car, with my improvement applied.

Figure 2 is a plan view of the under side of the same.

Figure 3 is a plan view of one-half of the floor of the same, showing the arrangement of the water-tanks under the seats.

Figure 4 is a view of the end of the car looking outward.

My invention consists in such a construction of and the application of a steam-engine and boilers, with the necessary accompanying machinery, to the ordinary street or other four-wheeled railway-car, as to accomplish the following objects, viz:

To make the extra weight as small as possible, consistently with the requisite strength and power, and to balance the weight of the steam-machinery and fixtures upon the car-body, so that the latter will not have a tendency to tip up at one end, but will rest easily, and in nearly a horizontal position upon the trucks, without straining the frame-work of the car.

To so locate the engine and boilers as to occupy no available room within or about the car, thus leaving the full and usual amount of seats and standing-room inside of the car and upon the platforms.

To so arrange the several parts of the steam-machinery that it may be applied to street and other cars already built, without any change of the body or interior of the car except a few slight and inexpensive alterations and additions, thus enabling owners of horse-cars to convert them into steam-cars with very little expense, and obviating the necessity of having new cars built for the purpose.

To so arrange the boilers and engines on an ordinary four-wheeled street-car as to obviate the necessity of turning it, thus dispensing with a turn-table or Y, usually required for that purpose.

To enable the engineer or car-driver to start and stop the car, and to manage the whole necessary machinery, at either end of the car, whichever end may be forward for the time being.

To provide an independent feed-pump, so that the boilers may be supplied with water while the car is stationary.

That others skilled in the art may be able to make, apply, and use my invention, I will proceed to describe its construction and operation.

The street-car shown is one of the ordinary class, having a four-wheeled truck beneath, and entrance-platforms and doors at each end.

The truck of the car may be substantially like the ordinary truck, but the axle of the driving pair of wheels B' has two cranks, *s s*, formed thereon, similar to the crank-shaft of "inside" locomotives.

The engine shown, and which I deem best in this application of steam-power, is an oscillating engine, embodying the devices for which Letters Patent were granted to me on the 4th day of December, A. D. 1860, as an oscillating engine is more compact and better adapted to the limited space which I allow for the engine and its appurtenances, although I do not wish to limit myself in this specification to an oscillating engine of any particular kind, as any engine that is operative, and that can conveniently be placed between the pairs of wheels, will answer the purpose.

The engine is placed beneath, and is attached to the car about midway, and may be secured to the car by being bolted directly to short sills attached to the bottom of the car, and the piston-rods *s' s'* of the two cylinders may be attached or connected directly to the cranks *s s* on the driving-shaft, the rods which lead to the throttle-lever and reversing-lever extending to each end of the car, so that the car may be started, stopped, or propelled in the opposite direction at either end of the car.

If desirable, the rag-wheels *r r* may be placed upon the axles carrying the endless chain *r'*, or any other equivalent means may be employed to transmit a rotary movement from the driving-axle to the other.

This is an important feature in my application of steam-power to street-cars, inasmuch as more traction is gained when the car is loaded, as all the wheels then become driving-wheels.

In the drawings—

A is the engine, which is placed between the trucks.  
*a* is the rod, extending from the throttle-valve at the engine along to each end of the car to the upright rod *a''*, at the upper end of which is the lever *a'*.

The lower end of the rod *a''* is bent, and connected with the rod *a*, so that by moving the lever *a'* in a horizontal direction, the rod *a* is moved, operating the throttle-valve.

The rod *e* is connected at each end of the car to the upright lever *e'*, which may be moved in the arc of a circle to reverse the engine.

*e* is the steam-supply pipe, leading from the boiler to the engine.

The boilers I place one at each end of the car, upon the outer end of the platform, and about midway across,



so that there shall be sufficient room to enter from either side of the platform, passing between the boiler and the main body of the car. The boilers are made as small as is consistent with the amount of steam required to be generated, and they are placed in an upright position, and properly secured to the platform, and they are also further secured in position by the hood or roof of the car at *F''*, being secured thereto in any proper manner.

To prevent radiation of heat from the boilers, to the injury of the wood-work of the car, and to the inconvenience of the passengers, I first whitewash the exterior of the boilers, and then secure felting thereto, say from one-quarter to one-half inch in thickness, and I then apply a coat of whitewash to the felting, and the whole is then sheathed all around with common wood sheathing, and then painted any desirable color.

It might be as well, perhaps, to omit the whitewash, as the radiation of heat might be as well prevented by the felting and sheathing, but I consider whitewash a good non-conductor of heat, and I therefore deem it best to apply it.

The boilers may be of the ordinary kind, and having a fire-box at the lower end; and underneath the platform, at the lower end of the fire-box, is a trap-door, *C*, through which to remove the ashes and cinders.

At the top of the roof or deck, one on each side, is a box or vessel, made tight, and extending the whole length of the car, and it may be raised a little above the roof of the car by means of rods or standards *t*.

The pipe *f* extends from the exhaust-chamber of the engine *A*, on the bottom of the car, passes up by the boiler at the end of the car, and into one end of the condenser or vessel *F*, as seen in fig. 1.

Another pipe, *f''*, extends from the other end of the condenser *F* into the smoke-pipe *C''*.

The escape steam from the exhaust-chamber may thus pass into the condenser and there be condensed, the surplus steam, if there be any, passing out at the other end of the condenser *F*, through the escape-pipe *f''* into the smoke-chimney of the boiler.

The water-tanks I arrange under the seats of the car, and there may be any desirable number of them to carry the requisite quantity of water.

The tanks are represented at *E*, in fig. 3, and are all connected together, or communicate with each other through the pipe *i*, and short pipes passing from said pipe *i* into the lower part of each tank *E*.

A short pipe also connects said pipe *i* with the pump *A'*, at the engine beneath the car, so that the pump, which is always left with steam on, when put in motion forces the water through the feed-water pipe *b* into the boilers *C*, drawing the water through the pipe *i* from the tanks *E*.

The pump *A'* being always left with steam on, may be started by simply turning the stop-cock *x* so that the water may pass from the pipe *b* into the boiler, and it may be stopped by turning said stop-cock so that the water cannot pass into the boiler.

The small pipe *i* extends from the condenser *F* upon the top of the car, down through the car at one corner, and into the tanks *E*, so that the water, which is formed by condensation in the condenser *F*, may pass freely down into the tanks *E*. The condenser *F* may as well, perhaps, be placed within the car and under the roof, but I prefer to place it above the roof, as the better adapted for the more rapid condensation of steam passing into it through the pipe *f*.

The stop-cocks or throttle-valves *x* may be best located just above the platforms *D''* in the feed-water pipe *b*, so that they are within easy reach of the engineer to operate the independent steam-pump *A'*, by letting in or turning off the water through the pipe *b*.

The engine, which may be of any desirable form and

construction, provided it possesses the requisite compactness and simplicity, may be sheathed around or protected by sheet-iron or other material, and may be reached through the trap-door *r''* made in the floor of the car, and by other trap-doors made in the outer sheathing, if desirable.

The boilers represented are about twenty inches in diameter, circular, and extending to a height which brings the smoke-pipe just above the roof of the car, the fire-box descending just below the floor, and having draught-holes *c''* therein.

To sustain the boilers properly, the platforms at each end may be extended from twenty to twenty-five inches, as may be desirable, giving a base for each boiler to rest upon, and, also, room for the engineer and fuel, without encroaching in the least upon the usual platform room.

This additional space may be sheathed with sheathing, so as to include the boiler, fuel-room, and standing-room for the engineer, if desirable, thus leaving an ample passage-way for the entrance of passengers.

The two boilers may be connected, if desirable, by a main steam-pipe, joining the steam-space of the two boilers, from which main-pipe the steam-supply may be carried to the cylinders of the engine, thus using the steam of both boilers together, and in some cases it might not be necessary to use but one boiler at all, the connection with the other boiler being shut off for the time being.

To allow more room for the engineer, the two boilers might be placed at the diagonal corners, instead of in the middle of the end, thus giving him the whole width of the platform, less the diameter of the boiler, while the weight would still be properly balanced on the truck.

A short upright, *x'*, is fixed to the platform, and to this upright, at *n'*, is pivoted a lever, *n*, and at *o*, at the end of the short arm of the lever, is attached a chain, said chain extending down through or at the end of the platform, and passing over a pulley, *o'*, secured in proper bearings; the other end of said chain being attached to the usual brake-arrangement upon the truck. With this arrangement, it is perfectly easy for the engineer to use both hands in manipulating the reverse-lever and the throttle-valve lever, and, at the same time, to place his foot upon the end of the long arm of the lever *n*, and, by a pressure thereon, to apply the brakes in stopping the car.

By the construction as herein described, it will be seen that the objects hereinbefore set forth can be readily attained, and that horse-cars already built can be readily and cheaply altered into steam-cars, and, also, that the method can be employed in new cars with economy and simplicity, the whole of the steam-machinery being external to the car, instead of being built into it, as has heretofore been done.

If desirable, the frame at the lower part of the car may be built of iron, and the body of the car built of wood, and separate from the iron frame, so that, if desirable, the iron frame may have a floor thereon, and be used to transport freight of any kind, and be easily and quickly converted in a passenger-car, by simply placing the body upon the frame, and properly securing it thereon.

It will be seen that by this arrangement of placing the boilers upon the platforms, one at each end of the car, and the engine and other heavy parts of machinery between the pairs of wheels, the weight is nearly evenly distributed about the car, so that when applied to short cars, such as are used upon horse-railways in streets, there is no danger that either end of the car will "jump" from the track when moving at a higher rate of speed than usual, but the car will move steadily and firmly upon the track.

The extra weight added to the car in this application of steam to passenger-carriages is so small and so



evenly balanced, and the help employed in either case being the same, (the engine driver taking the place of the horse driver,) the relative advantage of horse-cars or steam-cars for street-railways is reduced by my invention to the comparative cost of maintaining a steam-supply, or maintaining horses for propelling the cars, and this has been demonstrated to be largely in favor of steam-power.

The arrangement of the condenser upon the top of the car, and the connection therewith of the exhaust-chamber of the engine, by means of a pipe, does away with all the noise of exhaust steam, so that a car propelled by steam, according to this method, moves as noiselessly and easily as when propelled by horse-power.

It will also be seen that in the use of my invention, the proportions of the car are unaltered, and that no injury is caused to the appearance of the car, and no change is made in the accommodation of the passengers; and further, that the only alterations of consequence to be made in the car, to adapt steam-power to it, are the lengthening of the end platforms, exchanging one straight axle for a crank-axle, and bolting on the short under sills which support the engine.

The drawings and foregoing description relate to street-cars, but it is evident that the same method is equally applicable to the larger railroad-cars, called "dummies," which are used for short and frequent trips on railroads, instead of running a locomotive and train.

If desirable, the car may be properly warmed in winter by means of a pipe passing from the exhaust-chamber to the condenser, through the car, and so arranged that in winter said inside pipe may be used to conduct the exhaust steam from the exhaust-chamber to the condenser, and in summer the outside pipe may be

used. In this way, the car may be made comfortable even in the very coldest weather.

It might be better, however, to have a separate pipe brought into the car for the especial purpose of warming, as the heat could then be better regulated.

Having thus described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. A street-railway steam passenger-car, having a boiler at each end, arranged to balance the car, and operating in connection or independently, as set forth.

2. In a street-railway steam passenger-car, having the described arrangement of boilers, the arrangement of the propelling-engine beneath the car and between the pairs of wheels, as and for the purpose set forth.

3. A street-railway steam passenger-car, provided with condensers F F, one or both, arranged upon or within the roof, and in combination with water-tanks E, arranged beneath the seats, and with proper pipe-connections between them, as and for the purposes set forth.

4. In a street-railway steam passenger-car, having the described arrangement of boilers and engines, the double reversing-apparatus, with the reverse-lever, or equivalent device arranged at each end of the car, as set forth.

5. Also, in like combination, the throttle-valves, and their operating-connections arranged at each end of the car, as set forth.

6. In the described steam street-car, the independent pump, arranged to operate as set forth.

7. Also, the pipe *f*, connecting the condenser F with the smoke-stack, as set forth.

Witnesses:

L. W. LANGDON.

T. A. CURTIS,

C. E. BUCKLAND.