(No Model.)

2 Sheets—Sheet 1.

J. M. A. MONTCLAR.

GAS LOCOMOTOR FOR VEHICLES, &c.

No. 259,413. Patented June 13, 1882.

FIG_1_

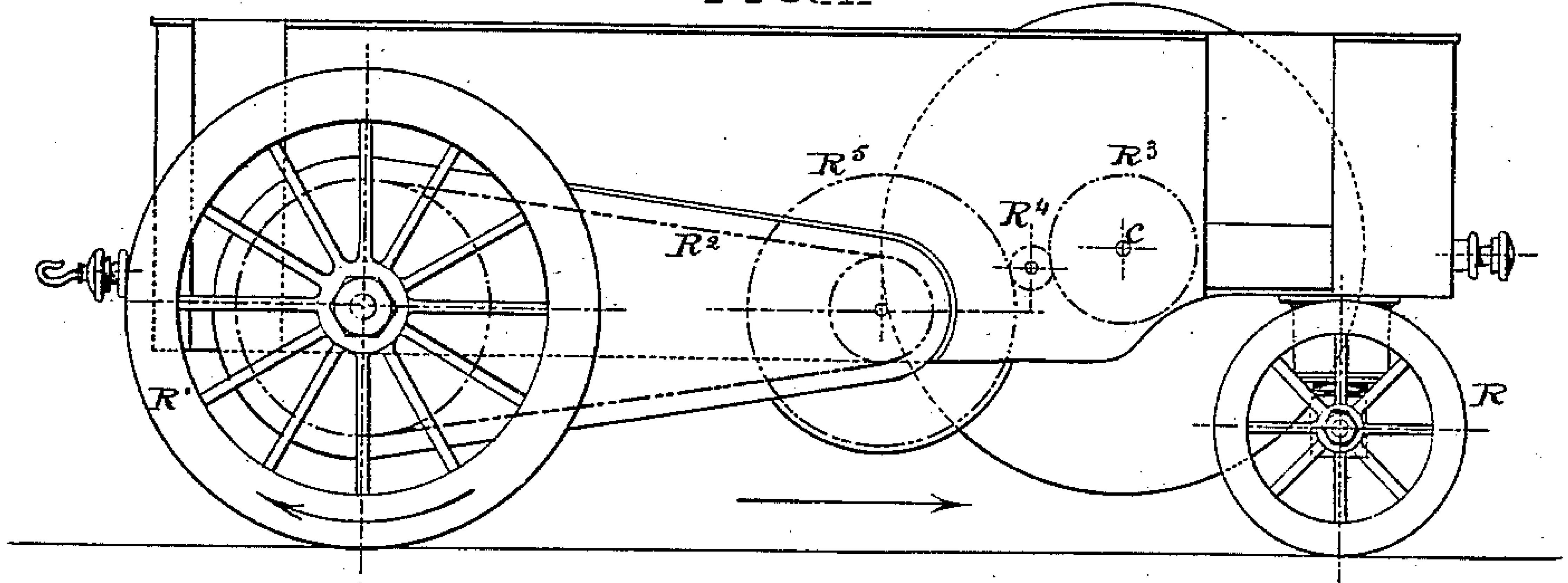


FIG_2_

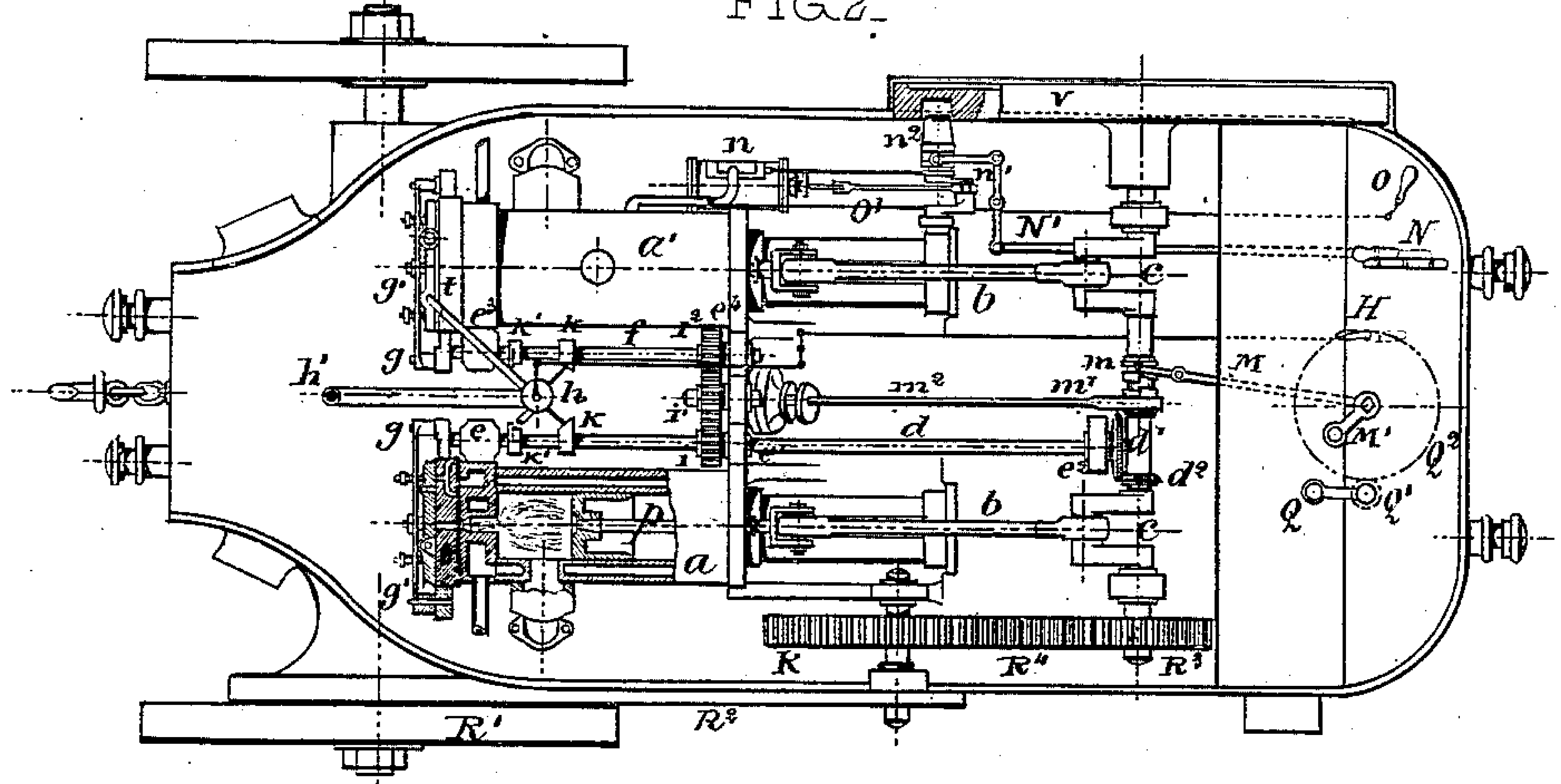


FIG_5_

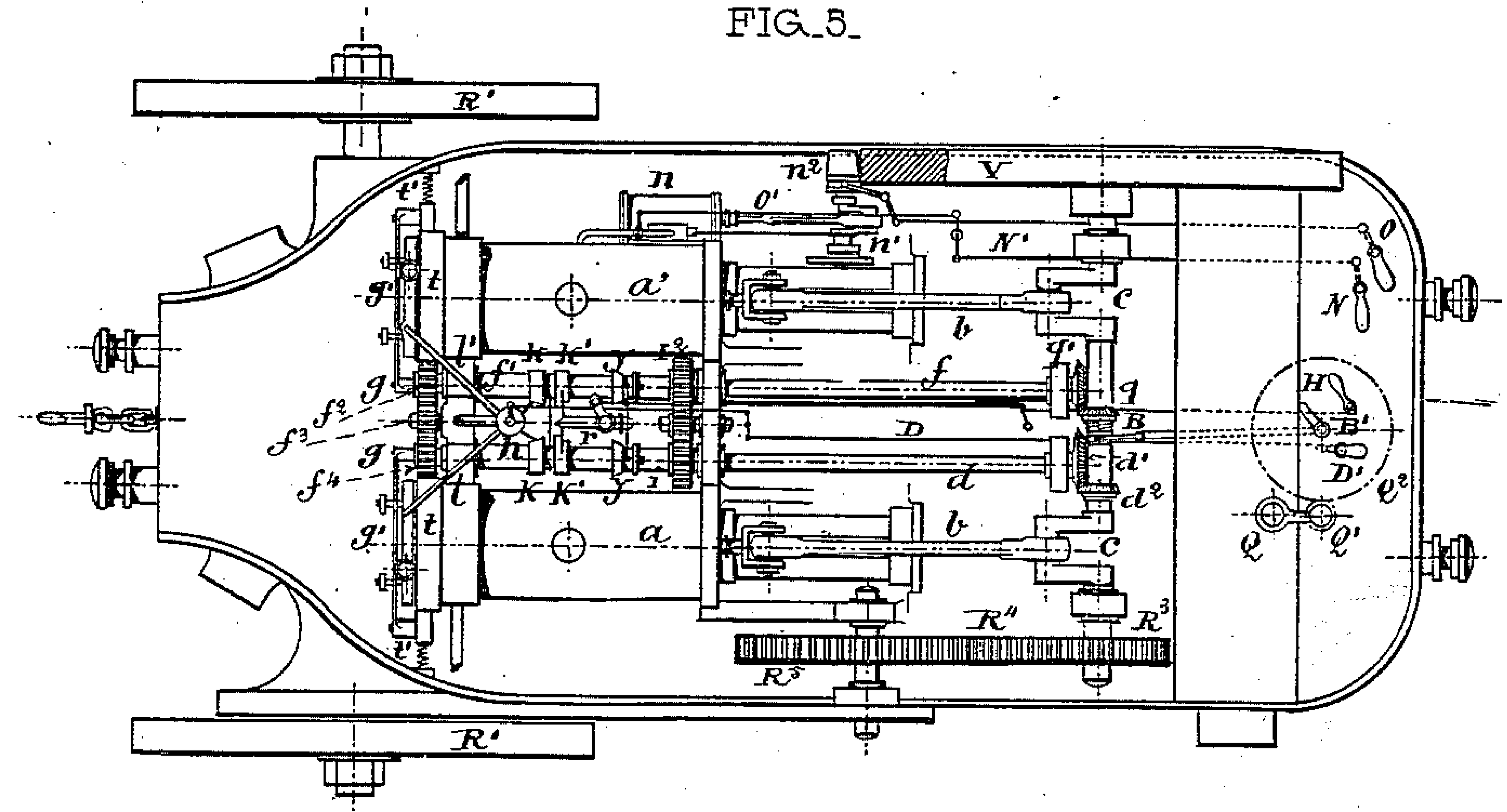


FIG_3_

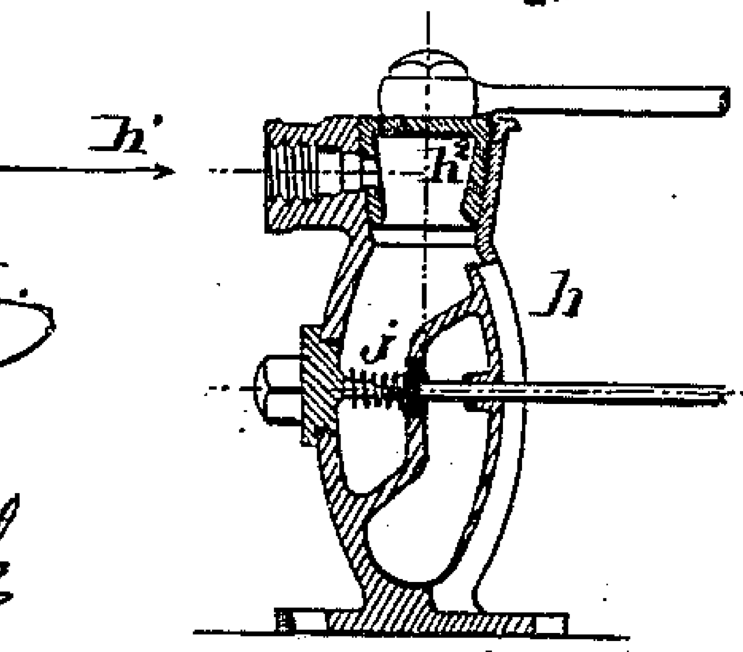
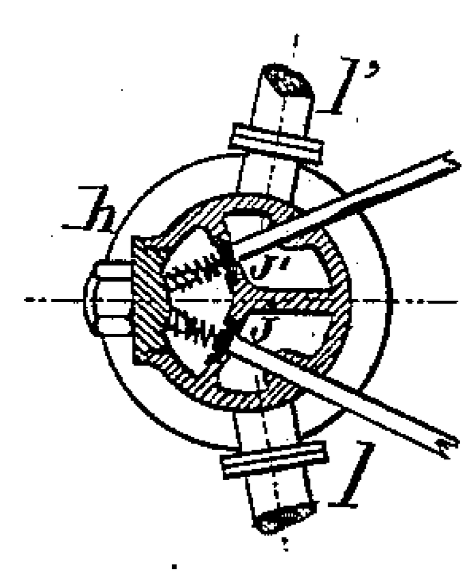


FIG_4_



Witnesses:

A. Blétry

A. Caufflich

Inventor:

J. M. Armand Montclar by

Briesen & Betts

attorneys

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. M. A. MONTCLAR.

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No. 259,413. Patented June 13, 1882.

FIG. 8.

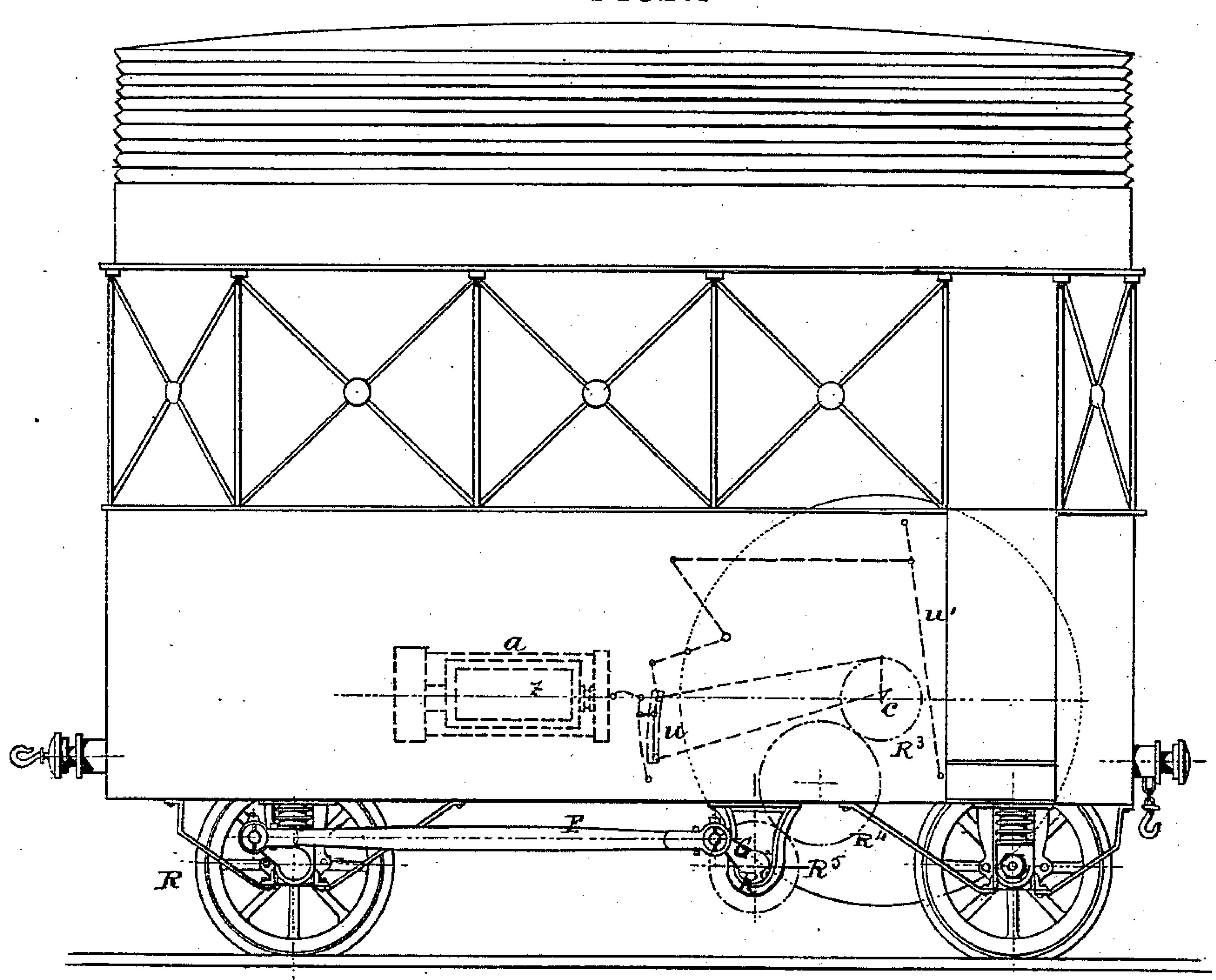


FIG. 9.

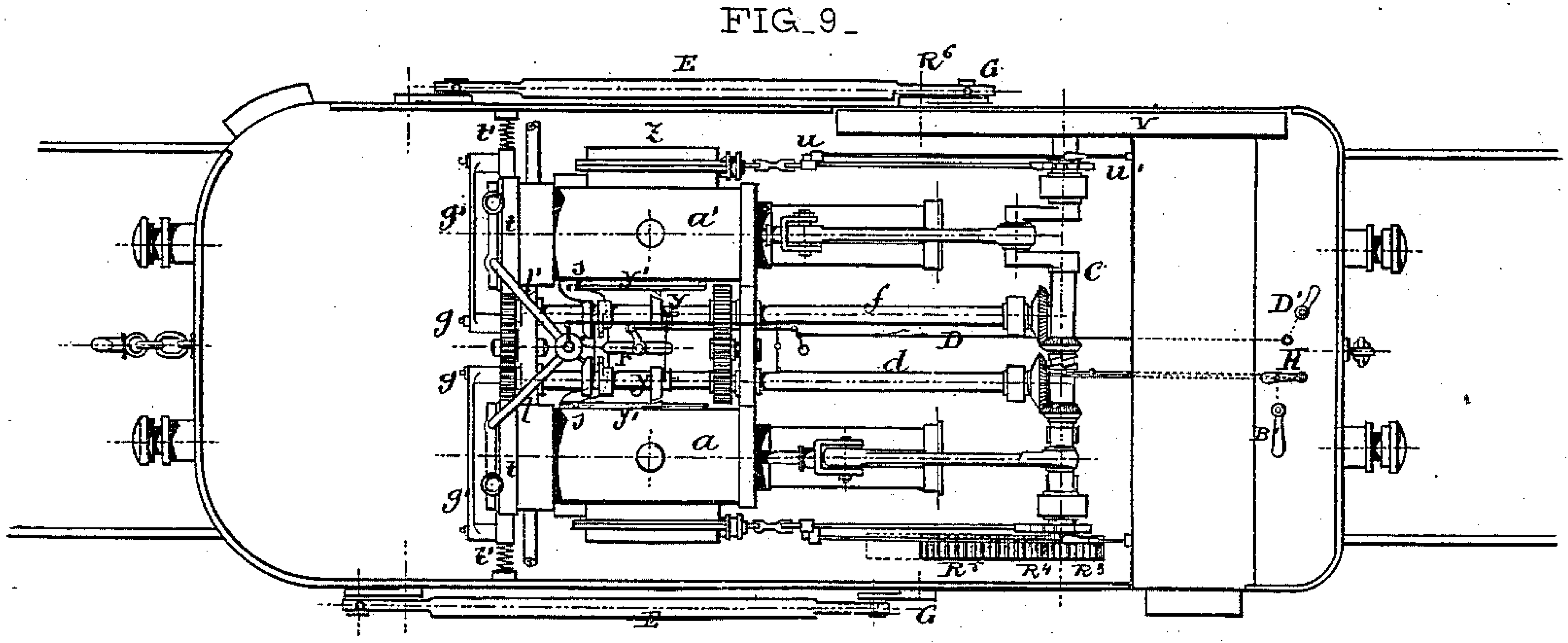


FIG. 6.

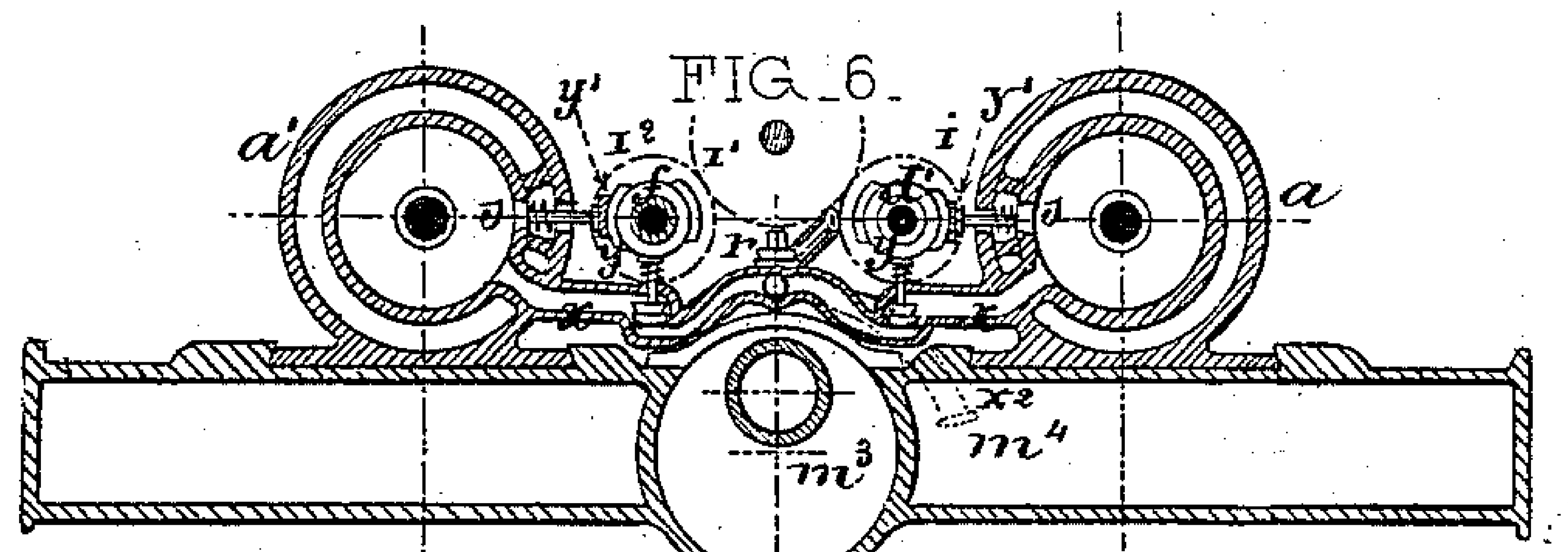
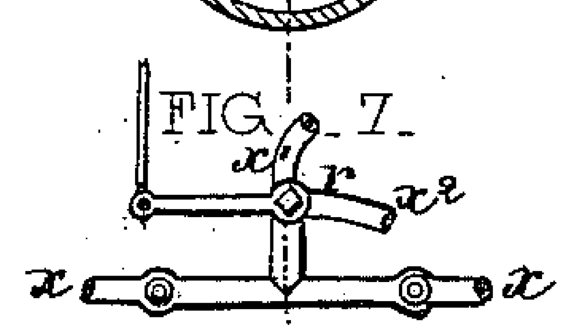


FIG. 7.



Witnesses:

A. Blétry

A. Caufflich

Inventor:

J. M. Armand Montclar

Briesen & Betts

Attorneys

UNITED STATES PATENT OFFICE.

J. M. ARMAND MONTCLAR, OF PARIS, FRANCE.

GAS-LOCOMOTOR FOR VEHICLES, &c.

SPECIFICATION forming part of Letters Patent No. 259,413, dated June 13, 1882.

Application filed February 15, 1882. (No model.) Patented in France December 10, 1881, No. 146,290; in Belgium December 15, 1881, No. 56,500, and in England December 17, 1881, No. 5,534.

To all whom it may concern:

Be it known that I, JEAN MARIE ARMAND MONTCLAR, civil engineer, of Paris, in the Republic of France, have invented a Gas-Locomotor for the Locomotion of Vehicles, Carriages, Tramways, Wagons, &c., (for which I have obtained Letters Patent of France, for fifteen years, dated December 10, 1881, No. 146,290; Belgium, for fifteen years, dated December 15, 1881, No. 56,500; England, for fourteen years, dated December 17, 1881, No. 5,534;) and I do hereby declare that the following is a full and exact description thereof, reference being made to the accompanying drawings.

My invention relates to the application of gas-motor engines and the special arrangements combined therewith to all kinds of vehicles for the purpose of substituting the same for horses or other beasts of burden, as well as for steam and compressed-air engines hitherto used for the locomotion of carriages, omnibuses, fire-pumps, tramway-cars, railways, &c.

Gas-motor engines acting by explosion, as now constructed, do not allow of an automatical motion, and could not as yet be used as locomotors in the same way as steam-engines.

The novel combinations which form the substantial part of my invention permit of the practical application of gas-motor engines as a means of locomotion.

The invention may be easily, and at little cost, applied to gas-motors of any desired construction, thereby rendering them easily manageable, so as to either move or stop instantaneously.

The gas-motor engines of my invention resolve in most satisfactory way the important question, namely, which is the most convenient way of locomotion in towns? They are noiseless, and provided with an invisible escape, so that there is no risk of frightening horses by whistling or other unusual noise. Besides, as gas is used for fuel, the engine is comparatively light, since it has no charge of fuel to support. The supply of gas may be renewed at any desired point during a trip.

There are still other considerations of economical and practical nature that plead in favor of self-moving gas-motor engines, which it is needless here to enumerate.

The machinery shown in the annexed drawings is arranged horizontally, but may be placed vertically or obliquely, if desired. The machinery may also either constitute a separate motor dragging the tram-car or carriage, or be arranged on or under the latter.

The engine shown is so arranged that an explosion will take place after every four half-strokes of the piston.

In the drawings, Figures 1 and 2 are side and plan views of a motor so arranged as to move on roads, and provided with an additional small starting-engine working by compressed air. Figs. 3 and 4 are vertical and horizontal sections of the gas-distributing box. Fig. 5 is a plan of another arrangement, to which the same small compressed-air engine is added. Fig. 6 is a cross-section through the cylinders carried by the machine. Fig. 7 is a detailed view, showing a portion of the mechanism. Fig. 8 is a side view and Fig. 9 a plan of another modification.

The motor illustrated in Figs. 1 and 2 is constructed according to the system known as "Otto's system" of gas-motor engines, but varies from it by a few new arrangements, which I shall set forth after having recapitulated the general principles of the said system.

Each of the cylinders a a' has a double casing for the circulation of the water necessary for their cooling.

p are the pistons; b, the connecting-rods, which are attached to the cranks c on the main shaft. On this shaft is also a bevel-gear wheel, d^2, which gears into another bevel-wheel, d', the diameter of which is double that of d^2, and which is fixed upon the end of a shaft, d, that is maintained in three bearings, e e' e^2. Bearings e^3 e^4 on the cylinder a' support a shaft, f, parallel with d. On the ends of shafts f and d are cranks g, to each of which a flat connecting-rod, g', is linked at one end, while the other end of such rod is connected with the air and gas distributing valve t of the cylinder near which it is placed. The shaft d communicates its motion to f by means of gears i i' i^2. The shafts d and f are provided with cams k k' for regulating the inlet and escape of gas, respectively.

The gas collected in the casing of the motor in receivers provided with fans or any other suitable arrangement is led by a tube, h', to a box, h, whence it is distributed by two valves, j and j', under the influence of cams k and k', first into pipe l, which brings it to cylinder a, and then into pipe l', which leads it to cylinder a'. Figs. 3 and 4 explicitly illustrate the new arrangement of box h for the inlet of gas. A cock, h^2, worked by the engineer by means of lever H, cuts off the gas when the engine is at rest or is required to stop. Thus the motor works in the same manner as Otto's engine; but its arrangement is different, owing to the particular motion of shafts d and f and the arrangement of the gas-inlet box, in which two valves command the distribution of gas between the two cylinders.

Upon the main crank-shaft I arrange a clutch, m, movable on a key and engaging, when necessary, by lever M and crank M' in a similar clutch belonging to eccentric wheel m', which, by its bar m^2, commands the piston of a pump, which pump exhausts the atmospheric air and causes it to flow back into a space, m^3, which I here suppose to be provided for in the framing of the machine, but which may otherwise be arranged at any convenient point.

The air compressed by the engine during its motion and collected in the manner stated is admitted, when necessary, to a cylinder, n, of a small additional motor, the piston of which connects with a crank-shaft, n, which is provided with a friction-roller, n^2, intended to act by friction on the circumference of the fly-wheel v of the main motor. The handle N moves the roller n^2 by means of link-connection N', in order to engage it in or disengage it from the fly-wheel v. Another handle, o, opens or cuts off the access of the compressed air with the aid of rod o'.

The motor shown is intended for traveling on roads and streets, and provided with four wheels—viz., two small trailing wheels, R, and two large driving-wheels, R'. The axles support the framing of the engine by means of suitable springs.

The front or trailing wheels, R, are steered by a handle, Q, which, by means of a worm, Q', commands a worm-wheel, Q^2, wedged upon an axle squared to the axle of the leading-wheels. The hind or driving wheels, R', are set in motion by chain R^2, moved by a set of gearings, R^3 R^4 R^5, from the main crank-shaft.

The compressed air is supposed to be gathered in receiver m^3, Fig. 6, as it is easy while the motor is working to obtain the necessary amount of such air. When the motor is to start the compressed air is admitted to cylinder n, and the small motor is thus instantaneously set in motion and rapidly acquires maximum velocity; but previously the conical friction-roller n^2 is engaged in fly-wheel v, and in consequence of this the fly-wheel is set into motion, and thereby causes the whole of the mechanism commanded by shaft c to move at the same time. Thus the explosions in the cylinders a a' soon become effective, and the velocity of the motion transmitted by the respective parts of the machine to each other increases in a considerable degree. The friction-roller n^2 is now disengaged and motor n stopped. The amount of compressed air just consumed is immediately supplied again by setting the air-pump to work; or if the longitudinal elevation of the ground represent any slope, it is advisable to wait till the motor goes downhill, as the compressed air may then be produced without waste, and the excess of work caused by said slope is thus made manifest in a strain which checks the motion to a suitable extent.

The air-pump may exclusively serve for checking the motion. If, however, its effect be not sufficient, a brake may be arranged so as to check either the fly-wheel v of the motor or the wheels R'. If such be the case, the brake should be so constructed that the shoes form inclined blocks or wedges.

The arrangement illustrated in Fig. 5 is almost the same as the one described above. The only difference is that the compressed air necessary for the additional engine, n, is generated by the set of pistons in the gas-cylinders a a'. This is obtained by the motion of slide-valves t, caused by pinions q q', one of these pinions being wedged on driving-shaft c and the other upon the shaft f. This shaft f crosses the shaft f', to which, by the gearings i i' i^2, the motion of shaft d is transmitted, in order to cause the cams k k' to perform their work. The shaft f communicates its motion by means of gearings f^2 f^3 f^4 to crank g, connecting-rod g', and to the slide-valve t of cylinder a, while it acts itself on the flat connecting-rod of the slide-valve of cylinder a' by means of its crank g.

The pinion q is set in motion by clutch B and lever B', so that when the detonating mixture is not required to enter the cylinders a a' the clutch B is disengaged, and springs t' make their respective slide-valves, t, resume one of their positions as shutters.

The clutch B, having only one tooth, can always be engaged in one and the same point only. The distribution of gas and air may thus be stopped at any convenient moment, and two valves, s, are provided in the casing of the cylinders a a' for the inlet of the air, which the pistons are to drive back into receiver m^3, Fig. 6. These two valves are not movable so long as the explosions last; but as soon as the access of the explosive mixture is checked the escape that had taken place before—that is to say, the free air—is forced back into receiver m^3 by means of a double cock, r, acted upon by the transmission D from lever D', and arranged in a box where the ends of the escape-pipes x x meet, and from whence tube x', forming a prolongation of said escape-pipes, leads to the atmosphere, and another tube, x^2, leads to the same receiver, m^3, Fig. 7. By handling cock r, in order to drive the escaping air into receiver m^3, and by the aid of the connecting mechanism D, two cams, y, are displaced, which are movable lengthwise on the shafts d and f, and which, either by levers y' or directly, lift the air-inlet valves s in due time.

The compressed air necessary for the motion of the starting-engine n is produced each time when the motion is stopped by reason of either the acquired inertia or slopes in the ground. This new arrangement may be employed in either case as a brake for the locomotor.

Figs. 8 and 9 are side and plan views of a device which I intend for the locomotion on railways.

The fluid with high pressure produced by cylinders a a' in the above manner and collected in m^3 is applied so as to act by expansion on the pistons of these cylinders a a'. To this end they are provided with a compressed-air distribution, z, which is set at rest by means of Stephenson's link-motion u, with working-lever u', or brought to the opening of the distributing-orifices by working the said link-motion inversely.

When the motor is started the access of compressed air is cut off, and slide-valves t t are simultaneously set in motion again for the distribution of gas and air.

The shaft c transmits the motion of one of the spindles of the motor by means of connecting-rods E, linked to cranks G, wedged at a right angle on intermediate shaft, R^6, of gearing R^5.

The water which has served for the cooling of cylinders a a' may be discharged on the road; but previously it is advisable to use it for heating the compressed-air cylinder of the starting-engine, Figs. 1 and 2.

The types of engines shown in the drawings are merely taken as examples, and it will be easily understood that as soon as the motion is obtained on shaft c there are various means of transmitting it by gearings, endless chains, or connecting-rods to one of the axles of the locomotor. The motor may also be either horizontal, vertical, or inclined, with one, two, three, or more cylinders, single or double acting, with or without fly-wheel.

If it so happen that the amount of compressed air proves insufficient, either at the beginning of or during the start, I reserve to myself to arrange an accessory air-pump worked by hand, or to place on the locomotor a mover with hand-winch to act upon the fly-wheel.

Having thus fully described my invention and the various means of its application, I do not claim as my invention the application to the motion of any special system of gas-motor engines working by explosion; but

What I claim is—

1. The combination of a gas-motor engine, having one or more cylinders, a a', and main crank-shaft, with which the pistons of said cylinders connect, with an air-pump operated by the said crank-shaft to assist in starting the motor and adapted to operate the same, and with valve mechanism t, j, j', and h^2, substantially as specified.

2. The gas-receiver h, having valves j j', and combined with pipes l l', substantially as and for the purpose specified.

3. The combination of the cylinders a a' of a gas-engine with a receiver, m^3, valves j j', and pipes l l', vessel h, and with cams k k', and valves h^2 and r, substantially as specified.

J. M. ARMAND MONTCLAR.

Witnesses:

A. BLÉTRY,

A. CAUFFLIEB.