(No Model.) 3 Sheets—Sheet 1.

J. BAIRD.

LOCOMOTIVE ENGINE.

No. 438,220. Patented Oct. 14, 1890.

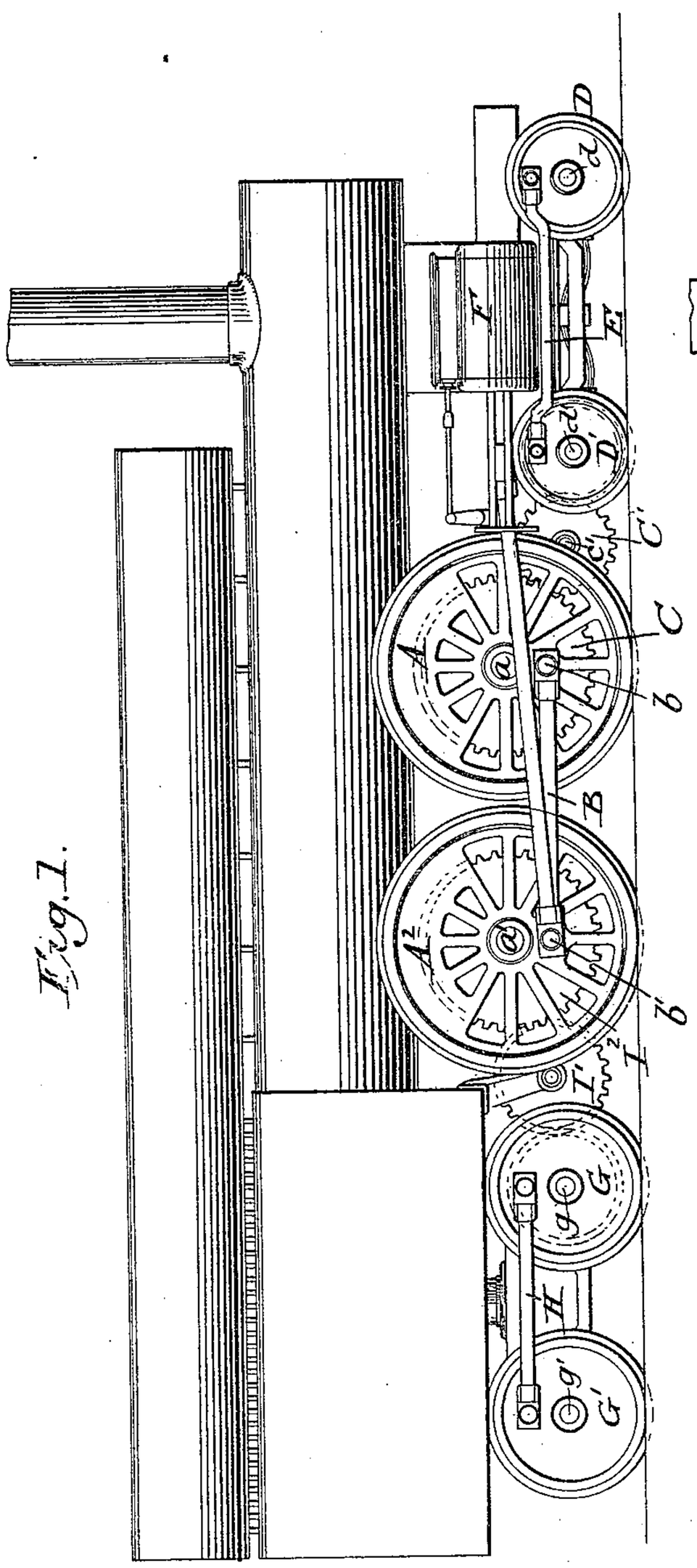

Fig. 1.

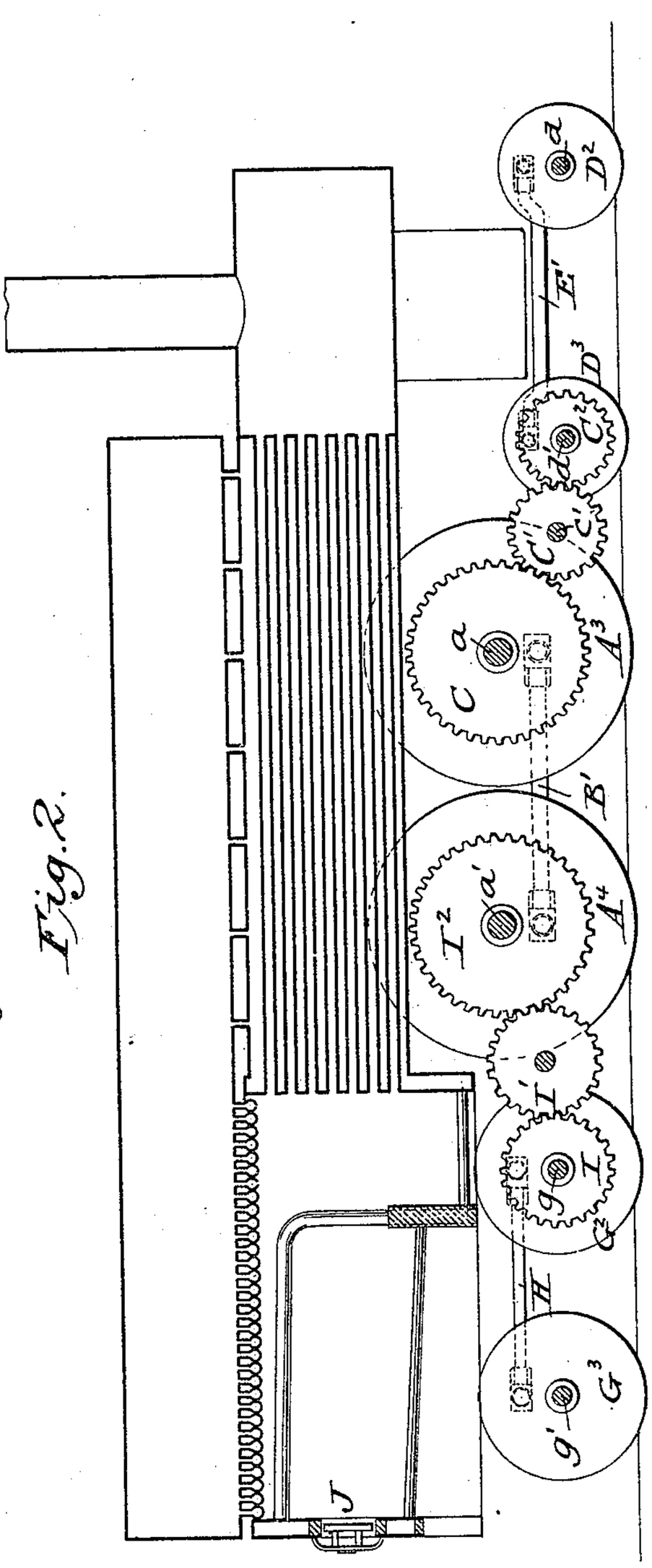

Fig. 2.

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Fig. 3.

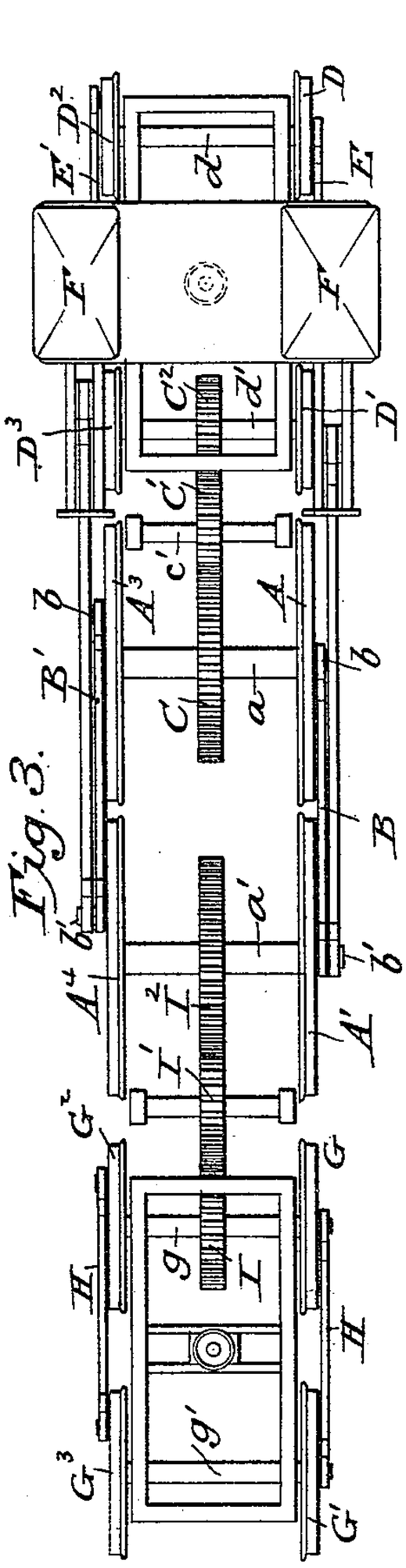

Fig. 4.

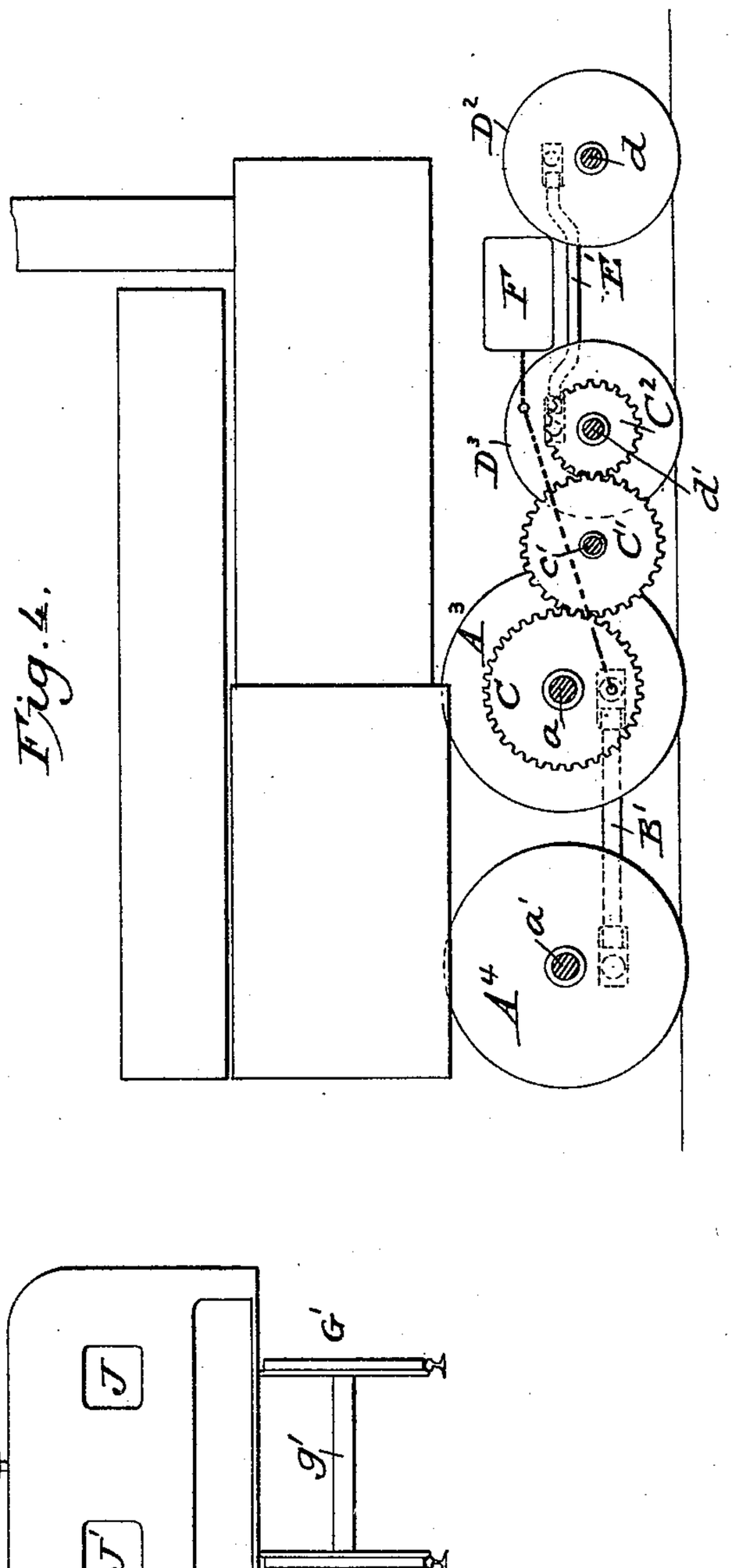

Fig. 5.

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Fig. 6.

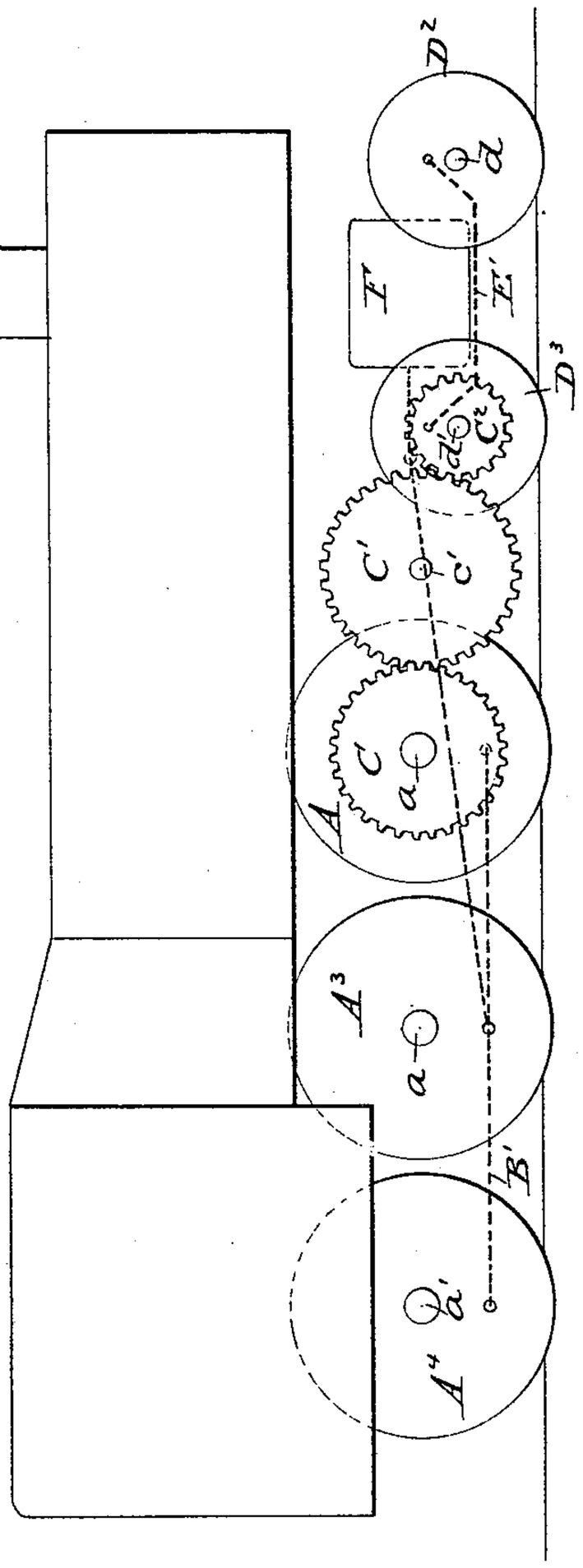


Fig. 7.

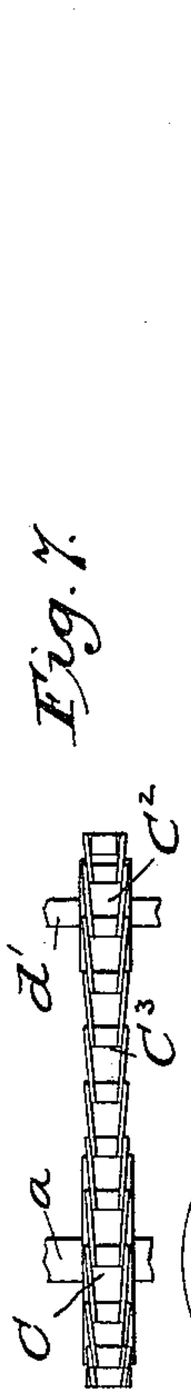
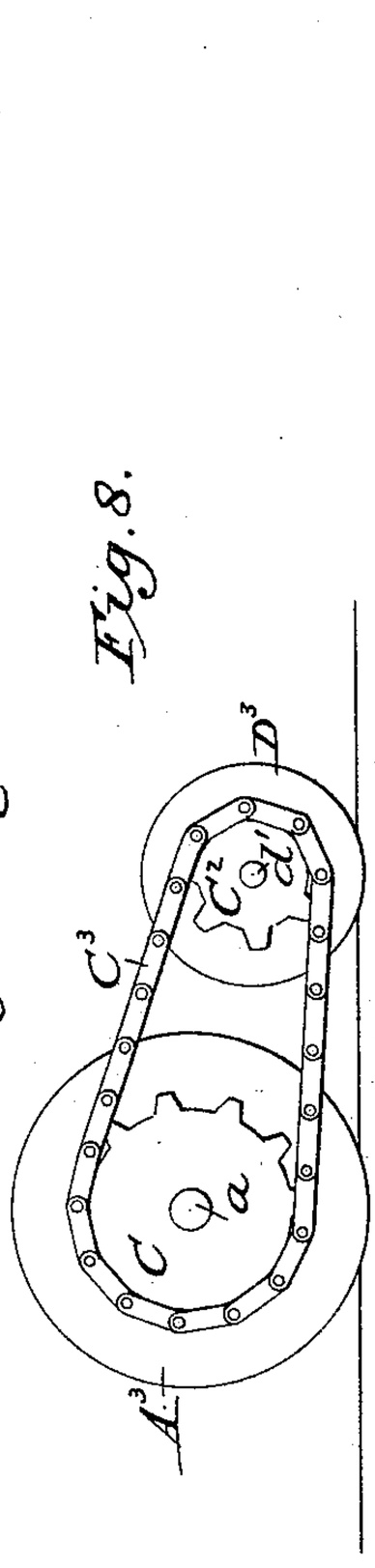


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN BAIRD, OF NEW YORK, N. Y.

LOCOMOTIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 438,220, dated October 14, 1890.

Application filed August 22, 1890. Serial No. 362,737. (No model.)

To all whom it may concern:

Be it known that I, JOHN BAIRD, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Locomotive-Engines, of which the following is a specification.

My present invention more especially relates to locomotives of the class in which the driving and supporting wheels are connected by gearing which utilizes the tractive power of such supporting-wheels without interfering with their capacity of conforming to curvatures of the track.

The first part of my invention relates particularly to the organization of such running-gear, while the second part of my invention relates to the adaptation to such running-gear of a wide fire-box.

My improvements consist in certain novel organizations of instrumentalities, hereinafter specified in the claims at the close of this specification.

The accompanying drawings show so much of various forms of locomotives embodying my improvements as is necessary to illustrate the subject-matter herein claimed. Some of these improvements, however, may be used without the others, and in engines differing in their details of construction from those herein illustrated.

Unless otherwise indicated the construction is usual and well known. The views are mainly diagrammatic.

Figure 1 shows a side elevation of an engine having four coupled driving-wheels geared with both front and rear truck-wheels. Fig. 2 represents a vertical longitudinal section therethrough, and Fig. 3 a plan with the fire-box and boiler removed. Fig. 4 is a vertical longitudinal sectional view of a locomotive having four coupled driving-wheels and a front truck geared therewith. Fig. 5 is an elevation of the fire-box end of the engine, showing a wide fire-box projecting laterally over the driving-wheels of such an engine. Fig. 6 is a vertical longitudinal section through an engine having six coupled driving-wheels and a front truck gearing therewith. Fig. 7 is a plan, and Fig. 8 a longitudinal section, of sprocket-gearing directly connecting the axles of the driving and truck wheels, respectively.

The engine shown in the first six figures of the drawings will first be described, beginning with the simplest organization shown in Fig. 4.

Figs. 1, 2, 3, and 4 show four driving-wheels A A′ A^3 A^4, mounted on axles *a a′*, connected with the frame in the usual way, and coupled together by links B B′ and crank-pins *b b′*, and driven, as usual, by pitmen B^2, directly connecting the piston-rods and driving-pins. A spur gear-wheel C, mounted centrally on the driving-wheel shaft *a*, gears with a corresponding intermediate gear C′, mounted on a shaft *c′*, carried by the engine-frame, and in turn gearing with a corresponding spur-gear C^2 on the rear axle *d′* of the front truck. (Shown as supported on four wheels D D′ D^2 D^3.) The face of the spur gear-wheels, the length of their teeth, and the clearance of their ends should be so proportioned as to allow the trucks to swerve or swivel on their pivots or king-bolts to conform to the curvatures of the track.

The driving and truck wheels are of the relative sizes usually employed for locomotive-engines, and their gears revolve with the axles upon which they are mounted.

The intermediate wheel C′, it will be observed, is of the same pitch but of less diameter than the driving-gear C, and the truck-gear C^2 is of still smaller diameter, the consequence of which organization is that the truck-wheels, though of smaller diameter, are driven with the same circumferential velocity as the driving-wheels, and of course in the same direction.

The truck-wheels on each side are connected by side bars E E′ with their opposite crank-pins set at right angles to each other.

In many cases the cylinders F lie so near the horizontal plane of the truck-axles that the action of the side rods would be obstructed. This difficulty I obviate by bending the central portions of the side rods downward, so as to avoid interference with the cylinders while doing their work, as shown in the drawings.

The organization shown in Figs. 1, 2, and 3 is similar to that above described, and the

parts being correspondingly lettered in all the figures a reiterated description of them is unnecessary.

The fire-box J^2 is shown in Fig. 4 as terminating at the rear of the driving-wheels; but in Figs. 1, 2, and 3 it is shown as extending behind them, this extension being supported upon a rear truck swiveled thereunder, and having four wheels G G′ G^2 G^3 mounted upon axles *g g′*, connected by side bars H and crank-pins, as hereinbefore described. A spur-gear I on the rear driving-axle *a′* meshes with a corresponding intermediate wheel I′, which in turn meshes with a corresponding gear I^2 on the front axle *g*. The rear truck-wheels, it will be observed, while smaller than the driving-wheels, are of larger diameter than the front truck-wheels; but the gearing connecting the rear driving-axle and the front axle of the rear truck is so proportioned as to drive the truck-wheels at the same circumferential velocity as that of the driving-wheels.

The organization shown in Figs. 1, 2, and 3 is such that the central portion of the boiler-shell is supported upon the driving-wheels, the smoke-box end by the front truck, and the fire-box by the rear truck in a manner somewhat similar to that common in Bogie engines, except that in such engines the smoke-box and cylinders are carried by the central wheels.

Fig. 6 shows the fire-box and boiler as supported upon six coupled driving-wheels, while its smoke-box end is supported upon a swiveled four-wheeled truck geared with the front driving-axle, in the manner hereinbefore described.

Figs. 7 and 8 show the central spur-gears C C^2 as directly connected by a sprocket-chain C^3, replacing the intermediate gear C′, hereinbefore described, the gears being so proportioned as to maintain equal surface speeds in the wheels to which they are connected.

Where front and rear trucks are employed, I prefer to distribute the weight so that approximately the front truck should sustain about thirty per cent., the four driving-wheels thirty-seven per cent., and the rear truck about thirty-three per cent.

The boiler shown in Fig. 6 is of the ordinary type. That shown in the other figures is substantially similar to the one shown in United States Letters Patent No. 434,973, granted to me August 26, 1890.

The grate-surface of locomotive-boilers is generally too small, as the width of the furnace is limited by the distance between the driving-wheels unless the furnace be lifted above them, which is practically inconvenient.

My improved organization above described enables me to employ a wide furnace or fire-box J^2, overhanging or projecting laterally over the wheels of the rear truck without raising the fire-box too high or interfering with the adhesion of the wheels to the track. My improvements, in fact, permit of a furnace of almost double the ordinary width.

Fig. 5 shows a furnace provided with two charging-doors J J′, one on each side, instead of the single central one usually employed. By charging the fuel through these doors alternately, with suitable intermissions, the gas from the fresh charge is ignited by the fire on the opposite side of the furnace, thus securing more perfect and economical combustion, and materially reducing the quantity of cinders and smoke usually discharged from the smoke-pipe.

I do not broadly claim herein the combination of driving and truck axles with connecting gearing, nor the combination of front and rear trucks with central driving-wheels; nor do I broadly claim connecting driving and truck axles by sprocket-gearing, all these features being old in the art, but limit my claims to the special organization hereinafter specified.

Having thus fully described the construction, organization, and operation of my improved locomotive-engine, what I claim therein as new, and as of my own invention, is—

1. The combination, substantially as hereinbefore set forth, of the coupled driving-wheels, their axles, the swiveling front truck, its rear axle, central gears carried by the front driving-axle and rear truck-axle, respectively, and a sprocket-chain directly connecting these gears.

2. The combination, substantially as hereinbefore set forth, of driving-cylinders, a truck-frame, and side bars connecting the truck-wheels and bent to pass around the cylinders.

3. The combination, substantially as hereinbefore set forth, of the wide fire-box, the boiler-shell, coupled driving-wheels under the shell, coupled truck-wheels under the overhanging fire-box, and central gearing connecting the rear driving-axle and front axle of the truck.

4. The combination, substantially as hereinbefore set forth, of the wide fire-box, the boiler, the smoke box, the coupled driving-wheels under the boiler, the coupled front truck-wheels under the smoke-box, the rear coupled truck-wheels under the overhanging fire-box, the driving-wheels and each set of truck-wheels being of different sizes, and central gearing connecting the adjacent axles of the driving and truck wheels, respectively, such gearing being so organized as to drive all the wheels with the same surface velocity.

In testimony whereof I have hereunto subscribed my name.

JOHN BAIRD.

Witnesses:
WM. G. WARD, Jr.,
ADDISON W. BAIRD.