

No. 776,494.

PATENTED DEC. 6, 1904.

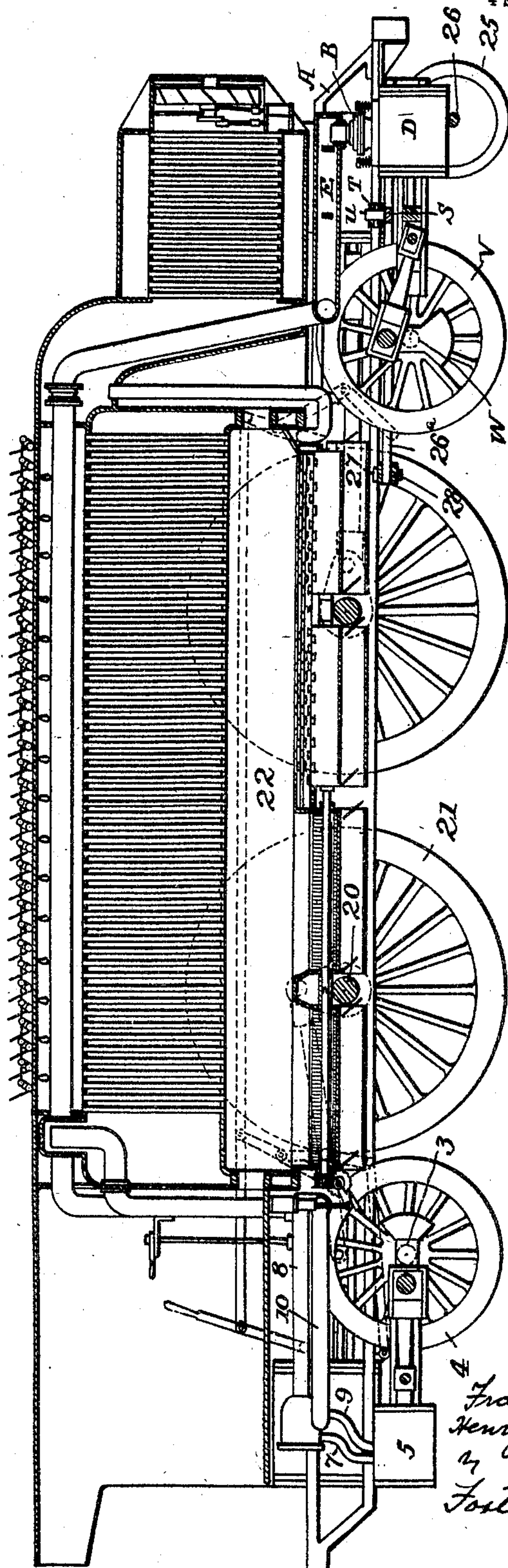
F. BURGER & H. M. WILLIAMS.  
LOCOMOTIVE.

APPLICATION FILED MAY 7, 1901.

NO MODEL.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

*John G. Hallman, Jr.*  
*Fred. P. Hinkel.*

Inventors

*Frank Burger*  
*Henry M. Williams*

*Foster Freeman*  
Attorneys

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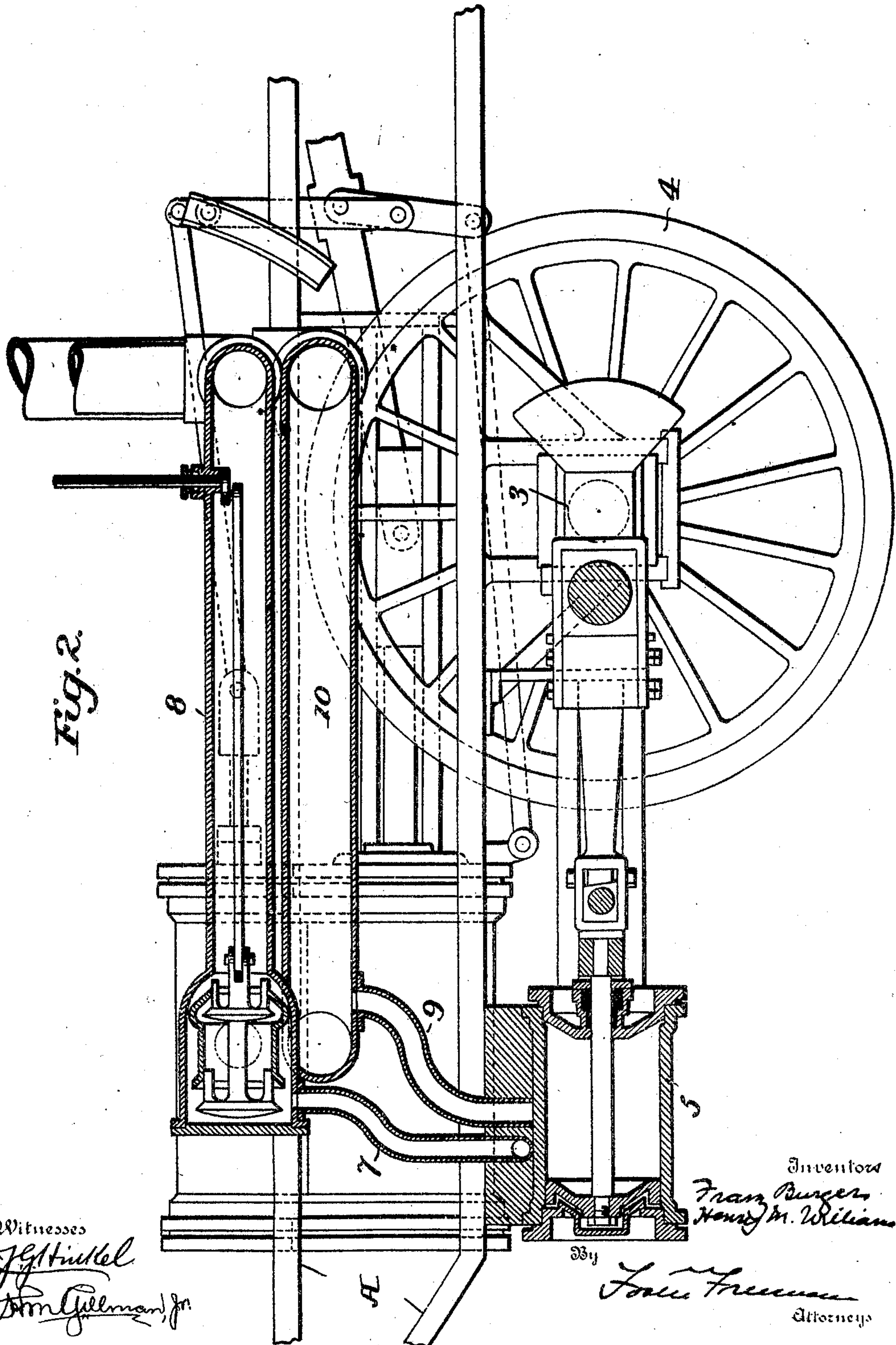
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4 SHEETS—SHEET 2.





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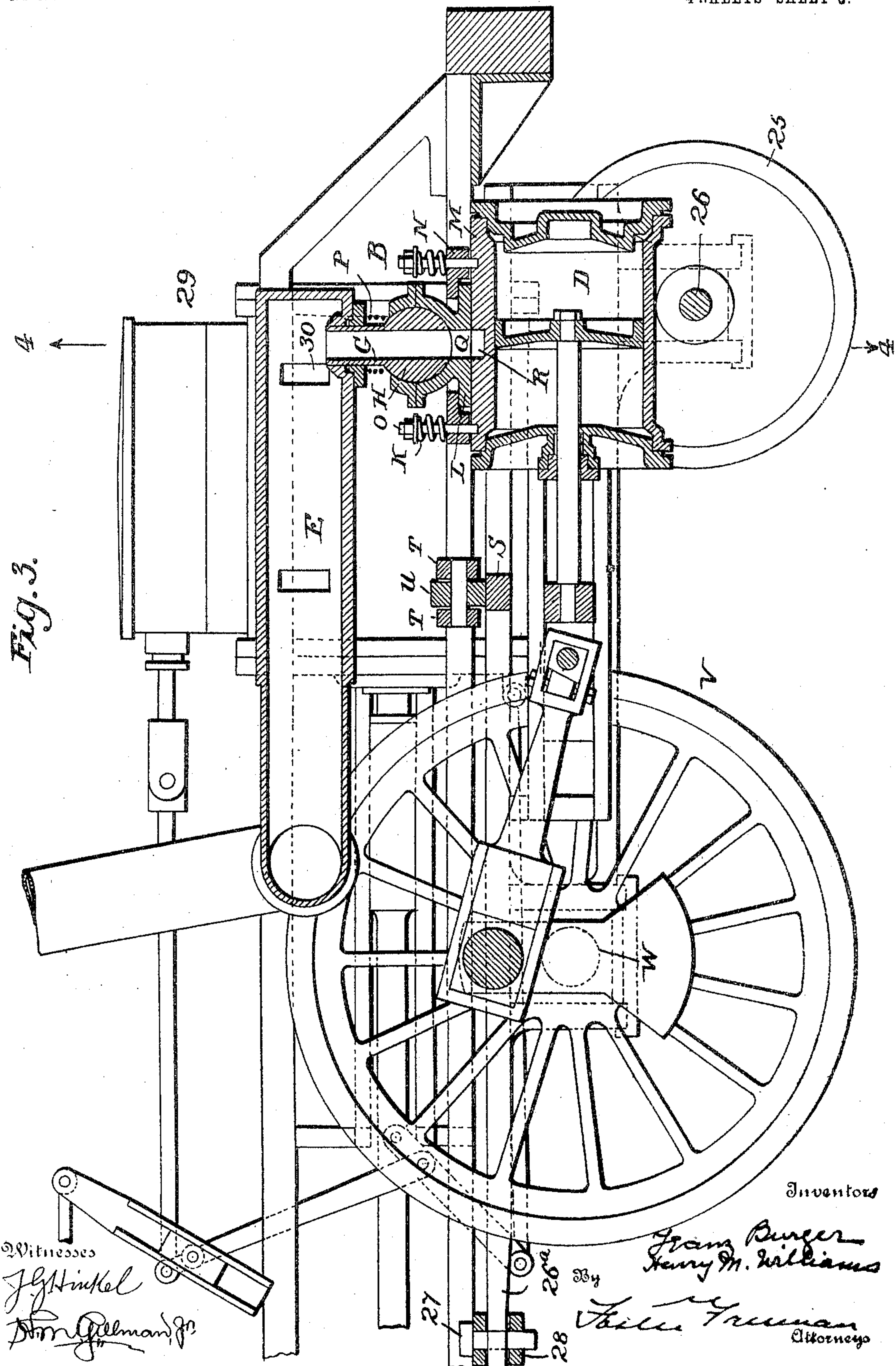
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4 SHEETS—SHEET 3.



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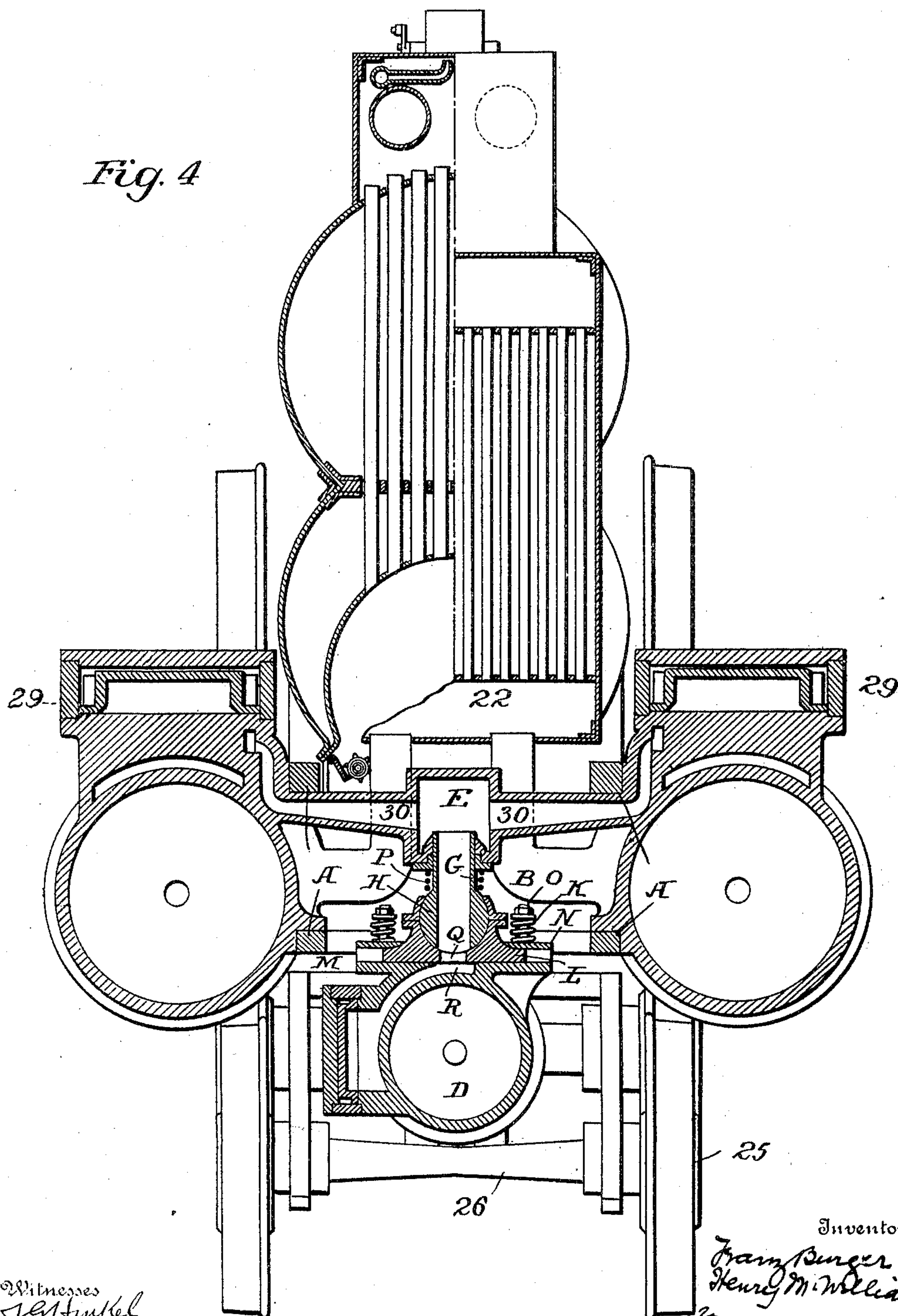
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NO MODEL.

4 SHEETS—SHEET 4.

*Fig. 4*



Witnesses  
*J. G. Hinkel*  
*Samuel Gillman, Jr.*

Inventors  
*Frank Burger*  
*Henry M. Williams*  
Attorneys  
*Julius Freeman*



# UNITED STATES PATENT OFFICE.

FRANZ BURGER AND HENRY M. WILLIAMS, OF FORT WAYNE, INDIANA;  
SAID BURGER ASSIGNOR OF ONE-HALF HIS RIGHT TO SAID WILLIAMS.

## LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 776,494, dated December 6, 1904.

Application filed May 7, 1901. Serial No. 59,139. (No model.)

*To all whom it may concern:*

Be it known that we, FRANZ BURGER and HENRY M. WILLIAMS, citizens of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Locomotives, of which the following is a specification.

Our invention relates to a locomotive-engine, and more especially to the running-gear thereof; and it consists in providing the engine with certain independent driving means and with flexible connections therefor, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a sectional side elevation of a locomotive-engine embodying our improvements. Fig. 2 is a sectional elevation of the rear end of the locomotive; Fig. 3, a sectional elevation of the forward end; Fig. 4, a transverse section on the line 4 4, Fig. 3.

The main frame of the engine is supported on the axles 20 of the main drivers 21 in any suitable manner and is provided with a steam-generator 22 of any desired construction, the construction shown being one in which the fire-box extends the whole length of the boiler with an underfeed-stoker which is not here described, as it constitutes no part of this invention. At the rear of the main frame is a supplemental axle 3, carrying a pair of supplemental drivers 4, the boxes of the axle 3 being contained in the pedestals 1, and to the cranks of the axle 3 are connected the connecting-rods of the supplemental engines 5, supported on the main frame and receiving high-pressure steam from the pipe 7 leading from the main steam-pipe 8. The exhaust from the supplemental engines 5 is conducted by pipes 9 to a low-pressure pipe 10, and the latter extends to the front of the engine, where the low-pressure cylinders are arranged.

At the front end of the locomotive there is an independent truck provided with supporting-wheels 25 on an axle 26 and with driving-wheels V upon a crank-axle W, the said driving-wheels being larger than the supporting-wheels 25, but smaller than the main driving-wheels 21.

Owing to the length of the boiler and the distance between the rear and forward bearings, it becomes necessary to make provision for an independent movement of some of the bearings, and the truck A, supported by the wheels 25 and drivers V, is therefore connected by a pivotal connection with the main frame. As shown, a central tongue 26<sup>a</sup>, extending from the truck A, receives an eyebolt 27, extending through slotted cross-bars 28 of the main frame, thereby affording the desired lateral movement of the truck in respect to the main frame.

In addition to the main cylinders 29 upon the forward part of the frame, connected with the forward drivers 21, there is an independent engine D, carried by the truck A, with its connecting-rod engaging the crank of the crank-axle W. The engine D receives the exhaust-steam from the engines at the rear, and the exhaust from the engine D passes to the cylinders 29, the various engines being proportioned to operate under the gradual expansion of the steam in any suitable proportions.

As the engine D is rigidly connected with the truck A and as the latter is movable in respect to the main frame, it is necessary to provide a flexible steam connection between the engine carried by the truck and the steam-pipe 10. Different flexible connections may be employed; but, as shown, the pipe 10 communicates with a pipe E, leading to a chest B, having a port Q coinciding with but smaller than the receiving-port R of the engine D and so connected that while a tight joint is maintained the engine can move laterally beneath the chest B.

In order to permit the rocking of the main frame independent of the truck, the connection between the pipe 10 and the chest B is made in the form of a ball-and-socket joint, a pipe G extending from the pipe E and terminating in a ball H, adapted to a socket in the chest B, the bottom plate L of which is ground to form a joint with the top plate M of the engine D.

The chest B is confined against the cylinder of the engine D, so as to slide freely by means



of an overlapping clamping-plate N, and the latter is held down upon the plate L by means of springs K, coiled round bolts O, passing through the clamping-plate into the cylinder.

5 These springs maintain a heavy pressure upon the plate of the chest B and maintain it in steam-tight contact with the plate M.

The pipe G is not secured rigidly to the pipe E, but has a neck passing through a stuffing-box and surrounded by a spring P, interposed between the ball H and the stuffing-box of the pipe E, so that there is no strain upon the steam-connecting conduit resulting from any vertical play of the main frame independent of that of the truck.

It is desirable to avoid to as great an extent as possible any pressure upon the flexible connections, and the main frame therefore has its bearings at some point upon the truck-frame. As shown, the main frame has cross-bars T T, between which are antifriction-rolls u, that bear upon a cross-bar s of the truck-frame.

While we have described the rear frame as provided with two cylinders or engines 5, there may be a single engine at the rear, and the forward truck may, if desired, carry two cylinders in place of one, and, if desired, the exhaust from the rear engines passing to the pipe 10 may pass directly from the pipe E through ports 30, dotted lines, Fig. 1 and full lines, Fig. 4, to the forward main driving-cylinder. By thus combining with the main frame and main drivers supplemental driving-wheels operated by independent engines we are enabled to secure additional driving force, and by any suitable arrangement of valves the steam from the boiler can be directed to any of the engines, as desired, or, as shown, first to one and then to the others, so as to adapt the power to the load and the inclination of the road in a manner that will result in maintaining the proper speed with the consumption of the minimum amount of energy and with the capacity to apply the maximum energy at any time when the conditions demand the same.

Suitable eccentrics and link-motions are provided, together with any desired arrangement of valves; but we have not attempted to show these or other parts of ordinary constructions and common to all locomotive-engines, but have confined our description and illustration to those parts necessary to enable our invention to be understood.

While we have illustrated and described herein certain features relating to the interior construction of steam generating and deliver-

ing apparatus in order that a complete and operative machine may be disclosed, we do not claim such features herein, but reserve the right to make them the subject-matter of another application.

Without limiting ourselves to any special type of locomotive or character of engines, we claim as our invention—

1. The combination in a locomotive of the main frame and drivers, and supplemental drivers at the opposite ends of the locomotive, and independent engines for operating the supplemental drivers, substantially as set forth.

2. The combination with the main frame and drivers of a locomotive-engine, of supplemental drivers at opposite ends of the main frame, engines for operating the same, and means for conducting the exhaust-steam from the engine at one end to that at the opposite end, substantially as described.

3. The combination with the main frame, the main drivers, and the engine of a locomotive, of supplemental drivers of less diameter than the main drivers, an engine for operating the supplemental drivers, and means whereby the exhaust-steam from one engine is conducted to the other, substantially as set forth.

4. The combination in a locomotive, of the main frame, drivers and engines, supplemental drivers and engine at the rear of the main frame, and a truck movably connected with the main frame at the forward end provided with supporting-wheels and drivers and an operating-engine, and a flexible conduit between the engine of the truck and the pipe leading from the engine at the rear end of the locomotive, substantially as set forth.

5. In a locomotive, the combination of the main frame, its drivers and engine, supplemental drivers at the opposite ends of the locomotives, independent engines for operating the supplemental drivers, means for conveying live steam to one of said independent engines, means for conveying exhaust-steam therefrom to the other independent engine, and means for conveying the exhaust from the latter to the engine on the main frame, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FRANZ BURGER.  
HENRY M. WILLIAMS.

Witnesses:

GEO. K. TORRENCE,  
O. ERVIN.