

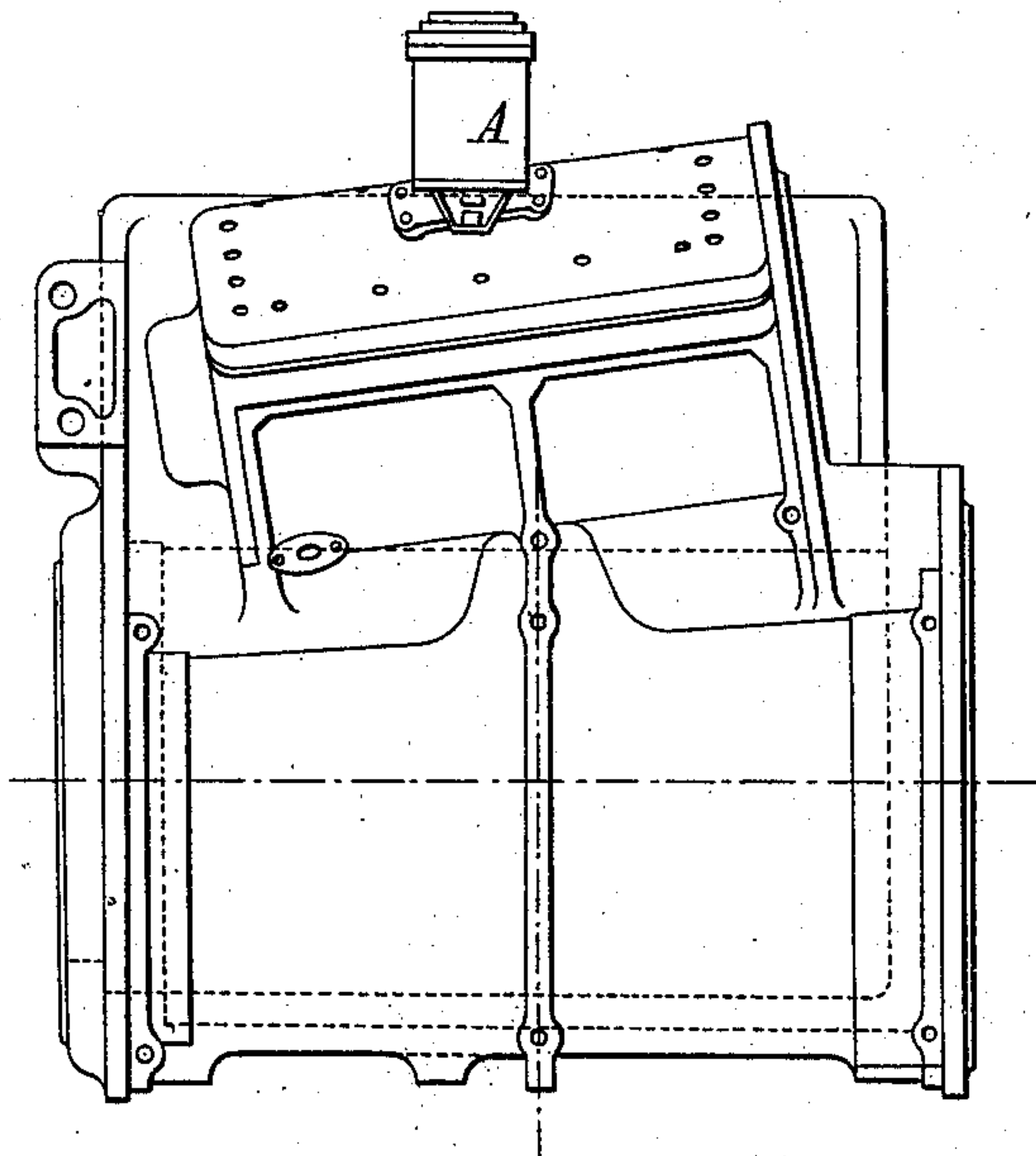
(No Model.)

T. RICOUR.  
LOCOMOTIVE STEAM ENGINE.

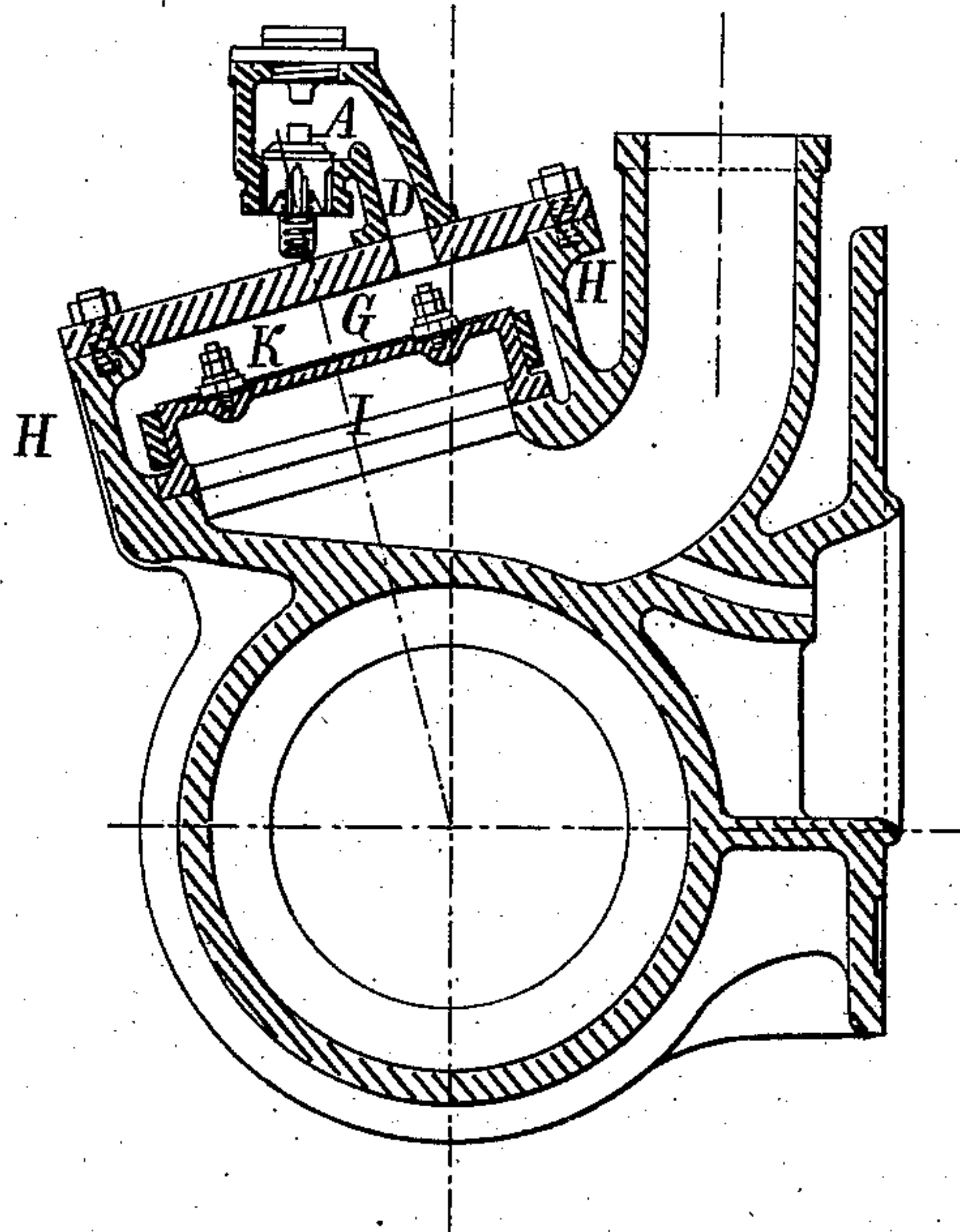
No. 292,588.

Patented Jan. 29, 1884.

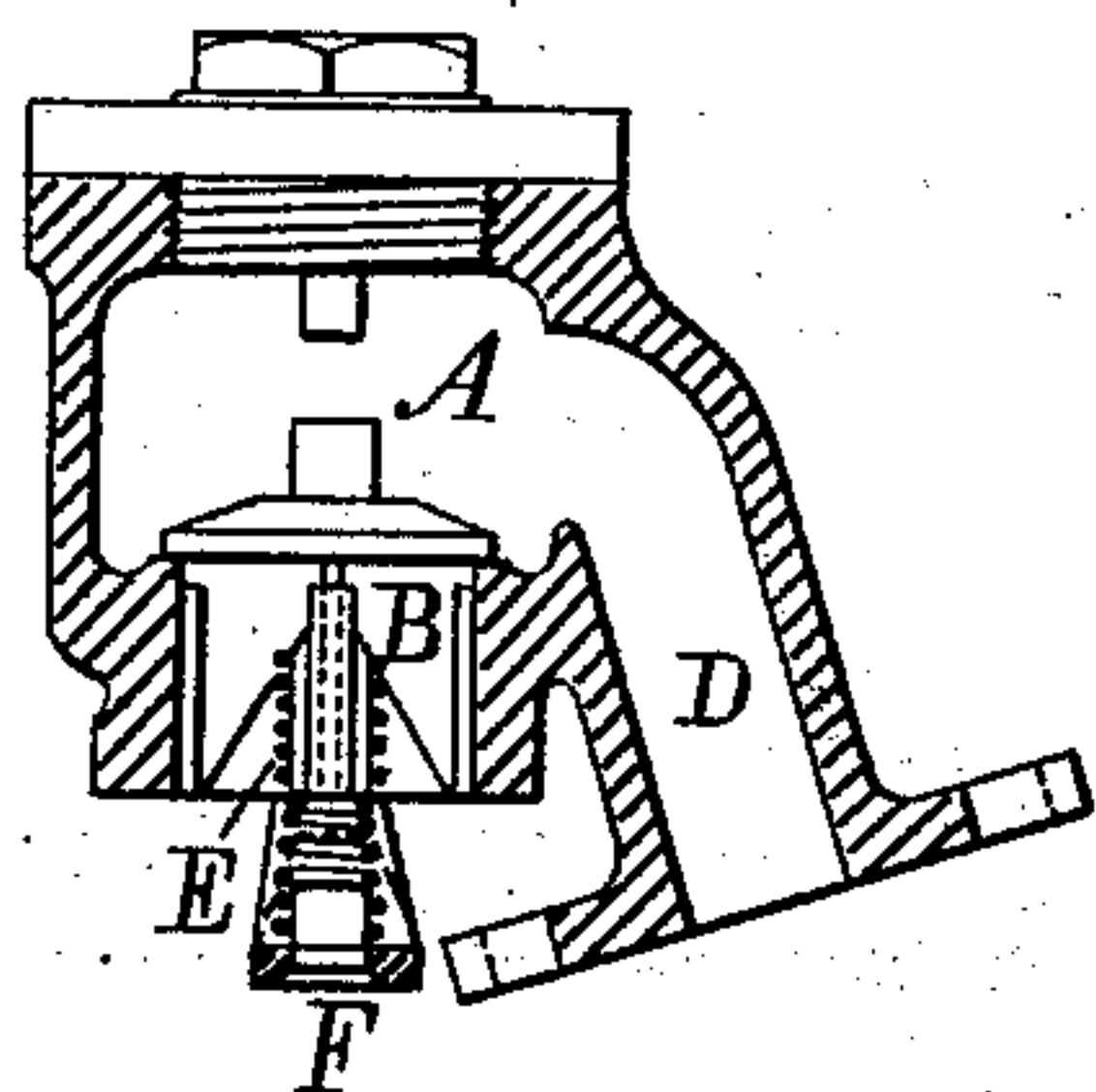
*Fig. 4.*



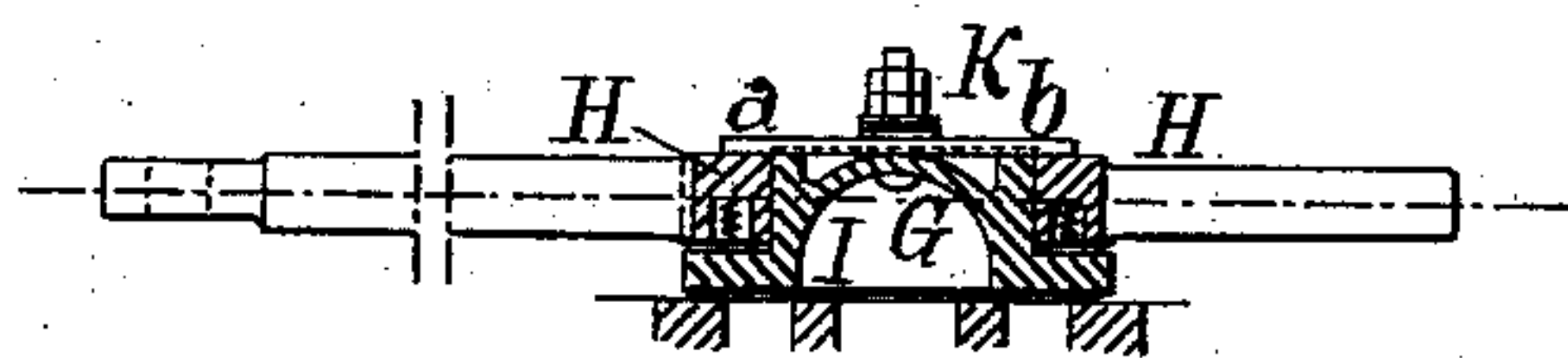
*Fig. 5.*



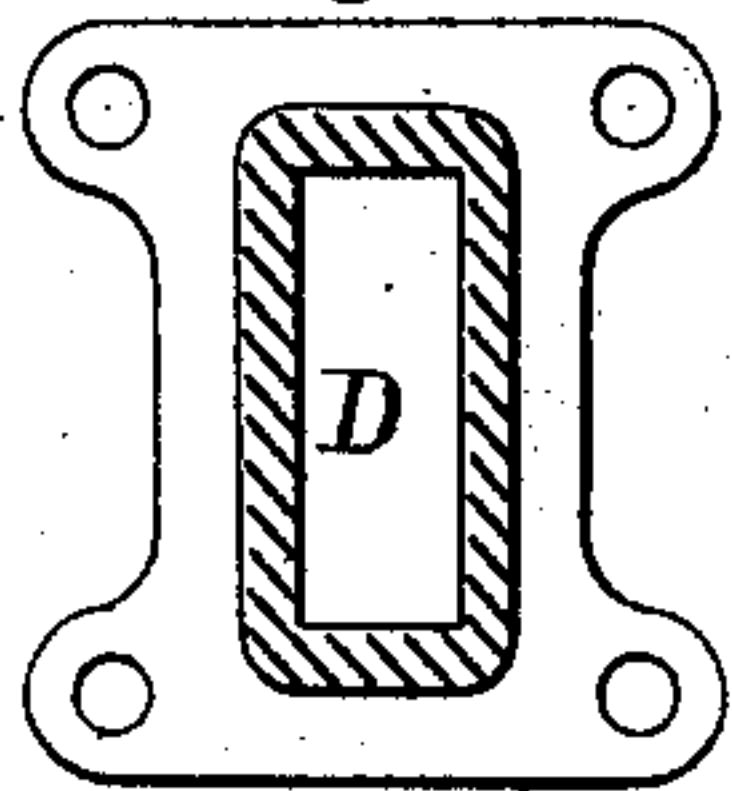
*Fig. 1.*



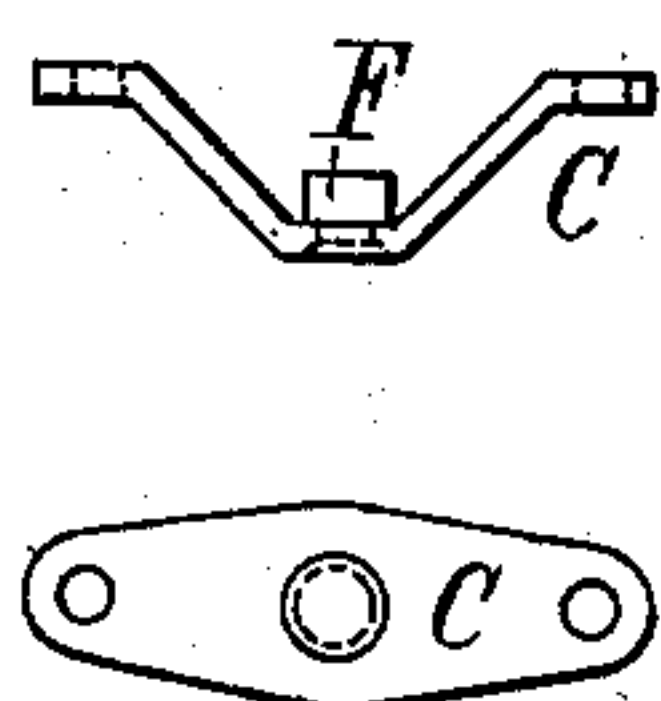
*AB. Fig. 6.*



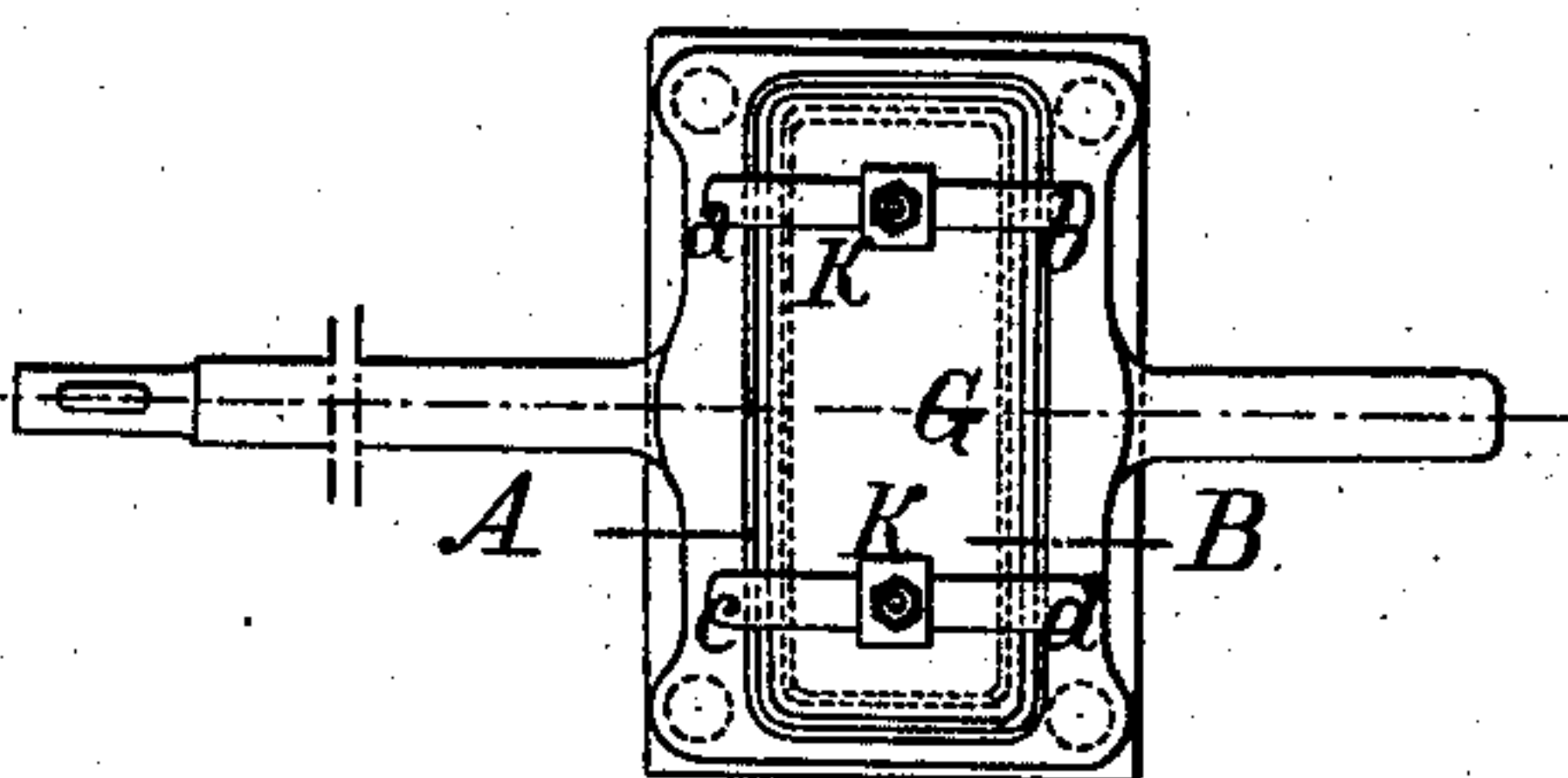
*Fig. 3.*



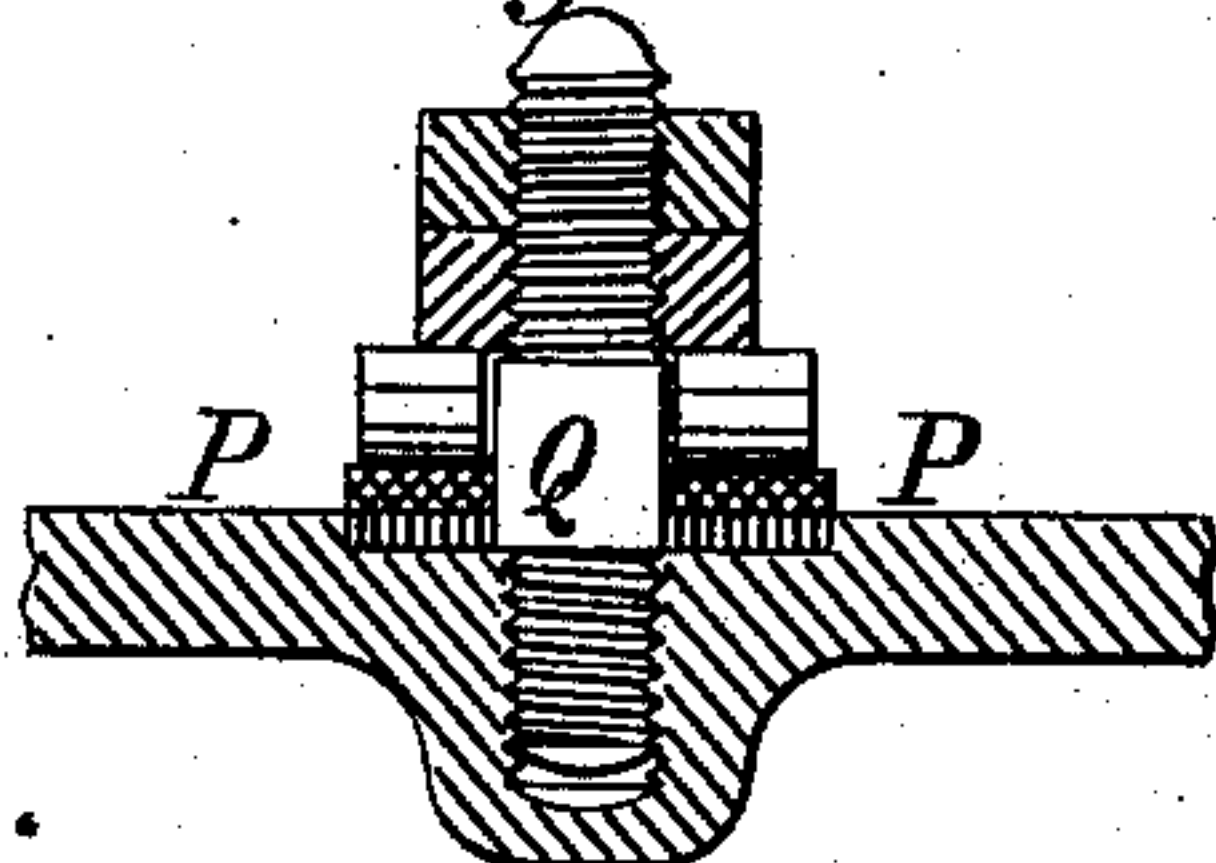
*Fig. 2.*



*Fig. 7.*



*Fig. 7<sup>bis</sup>.*



Witnesses:

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# UNITED STATES PATENT OFFICE.

THÉOPHILE RICOUR, OF TOURS, FRANCE.

## LOCOMOTIVE STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 292,588, dated January 29, 1884.

Application filed April 3, 1883. (No model.) Patented in France July 20, 1882, No. 150,179.

*To all whom it may concern:*

Be it known that I, THÉOPHILE RICOUR, of Tours, in the Republic of France, have invented a certain Improvement in Locomotive Steam-Engines, of which the following is a specification, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to the means employed to provide for the free admission of external air to the interior of the steam-chest or slide-valve casing of locomotive-engines when running with the steam shut off, and also to the means employed for raising slide-valves slightly off their seats when the engines are thus running without steam.

The principal advantages resulting from such admission of air to the steam-chest and from the raising of the slide-valve when air is so admitted are the following, viz:

1. Less wear of the slide-valves and cylinders. In fact, the slide-valves and motive-pistons are enabled to move in an atmosphere of pure fresh air instead of moving in an atmosphere composed of the hot gases laden with ashes which are alternately drawn in and expelled through the exhaust-passages in engines of ordinary construction. Owing to the air-valves, the slide-valve seats are preserved from becoming dirty with deposits of ashes, so that the slide-valves may be readily separated therefrom, and wear is thus prevented.

2. Facility and economy of lubrication. This facility for lubricating arises from the lower temperature, which is thus maintained in the valve-casings and in the cylinders, and renders it possible to lubricate them with mineral oils and carburets of hydrogen. Valuable results are obtained by lubricating with pure carburet of hydrogen, as hereinafter set forth in paragraphs 3<sup>a</sup> and 3<sup>b</sup>.

3<sup>a</sup>. Preservation of the boilers from corrosion. This corrosion is usually caused by the acids resulting from the decomposition of fatty matter on vegetable or animal oils, and is prevented by rendering it possible to employ mineral oils or carburet of hydrogen exclusively.

3<sup>b</sup>. Prevention of deposits of oleates upon the piston's cylinder ends, ports, &c. These deposits result in a great part from the decomposition of vegetable oils, and the combination

of oleic acid with oxides of iron. No deposit is formed when carburet of hydrogen is employed as a lubricant. The flat sides of the pistons and the cylinder ends are kept clean, and these surfaces may be effectually enam- eled, and a considerable saving of steam thus effected by reducing the loss by condensation during the period of admission.

4. Better action of the furnace when the engine is running without steam. The air from the exterior drawn in through the valves is expelled through the exhaust-pipe, and produces a strong draft in the chimney, which enables the boiler to be supplied with water when the steam is shut off without lowering the pressure. The locomotive thus acts as a blowing-engine for promoting the draft in the chimney.

5. Reduction of the waste of power in overcoming frictional resistance. The slide-valves are rendered susceptible of a high polish, so that the coefficient of friction is considerably diminished, and the waste of steam when working with a full supply, being proportionate to this coefficient, is thus in great measure reduced.

6. Less fatigue for the engine-driver. This advantage results from the facility with which the valve-gear or reversing-levers are enabled to be worked, arising from the easy motion of the slide-valves. The working of these levers, which is frequently necessary on uneven lines, forms a considerable part of the manual labor of the engine-driver.

My invention consists in the combination, with the slide-valve casing or steam-pipe of a locomotive steam-engine, of a valve adjustable and balanced for the admission of air during the time that the engine is running with the steam shut off, and arranged to open upwardly, thus dispensing with any closing-spring applied to the valve. In order to prevent the said air-valve from knocking or rattling continually upon its seat when the steam is shut off, the valve may be provided with a coiled spring, which opens it and holds it open to the extent of about one or two sixteenths of an inch. Consequently the valve is held to its seat when steam is admitted to the steam-chest, and is lifted off its seat by said spring when the steam is shut off. The combination



of the opening-spring with the air-valve forms a part of my invention.

The invention also consists in the combination, in a locomotive steam-engine, with the flat slide-valve and its driving-yoke, of one or more blade-springs attached to the valve and bearing against said yoke, and tending to constantly hold the valve off its seat when it is not pressed forcibly thereon by steam-pressure within the steam-chest.

In the accompanying drawings, Figure 1 is a vertical section of the balanced air-valve. Fig. 2 is an elevation, plan, and side view of a bridge employed to form the bearing of the counter-spring that balances the valve. Fig. 3 is a transverse section of the tube leading to the valve, which is fitted to the cover of the slide-valve casing, and shows the mode of connecting it to the said cover. Fig. 4 is an elevation of the steam-chest of a locomotive-engine, fitted with an air-valve and a flat slide. Fig. 5 is a transverse section, showing the air-valve in section and the arrangement of the springs attached to the back of the slide valve, and holding the latter slightly lifted off its seat whenever the steam is shut off. Fig. 6 is a transverse section of the slide-valve, which is represented as being lifted a small distance from its seat. Fig. 7 is a plan of the slide-valve, fitted with springs tending to lift it from its seat when the steam is shut off. Fig. 7<sup>bis</sup> is a transverse section of a spring, showing the mode of attaching the latter to the back of the valve.

The air-valve system is composed of valve-box A, provided at its upper part with a screwed plug, which serves to limit the rise of the circular valve B, and enables access to be readily obtained to the interior of the apparatus. This box A is fixed to the slide-valve casing by a flange of rectangular form, corresponding to that of the passage D, which connects the box A with the slide-valve. The air-valve B is arranged to open upwardly, and hence requires no closing-spring.

In order that the valve B may remain slightly lifted when the steam is shut off, the lower part of this valve is placed upon a coiled spring, E, retained in position by a metal cross-piece, F, fixed under the orifice for the admission of air to the valve. This cross-piece is provided with a central stud or boss, which acts as a guide to the spring E. It will, moreover, be readily understood that the form of valve is simply indicated by way of example, and may be modified as may be found advantageous for the object in view.

Figs. 4, 5, 6, 7, and 7<sup>bis</sup> show clearly the application of the aforesaid air-valve to a locomotive-cylinder with a flat slide-valve and the means employed to lift the slide-valve slightly from its seat when the steam is shut off. In

the arrangement illustrated this result is obtained by simply employing a couple of flat springs, *a b c d*, attached to the back of the valve G at K, and resting at their extremities upon the edges of the driving yoke or frame H.

Fig. 7<sup>bis</sup> shows the details of the filling at K. A pin, Q, having a square shank, is screwed into a boss cast on the valve, and a small rectangular locking-plate, *p p*, let into a recess in the back of the slide-valve, locks this pin and prevents it from becoming unscrewed.

The two locking-plates of a slide-valve may be made in one piece, engaging simultaneously with the pins Q of both the springs, and in this case there is no necessity for the recess in the back of the valve. The blade-spring is shown over the locking-plate in section by cross-hatchings, and a set of washers or filling-pieces of different thicknesses is placed over the spring, and over these is a nut and lock-nut.

In order to prevent the space between the valve G and its seat I from exceeding the proper limits, it is easy, when the valve wears away after a certain amount of work, to place a filling-piece of suitable thickness under the spring, so as to compensate for the wear.

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

1. The combination, with the slide-valve casing or steam-pipe of a locomotive steam-engine, of a valve adjusted and balanced for the admission of air during the time that the engine is running with the steam shut off, and arranged to open upwardly, substantially as hereinbefore described.

2. In a locomotive steam-engine, the combination, with the air-valve applied to the steam-pipe or slide-valve casing, and operating as hereinbefore set forth, of a coiled spring applied to said valve for the purpose of opening it and holding it open when the engine is running with the steam shut off, substantially as hereinbefore described.

3. The combination, with the flat slide-valves of a locomotive steam-engine and its driving-yoke, of one or more blade-springs bearing against the said yoke and tending to constantly hold the valve off its seat when not pressed forcibly thereon by the steam-pressure, substantially as hereinbefore described and illustrated in Figs. 6, 7, and 7<sup>bis</sup> of the accompanying drawings.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THÉOPHILE RICOUR.

Witnesses:

EDWARD P. MACLEAN,  
EUG. DUBOIS.