2 Sheets
Sheet 1

A. De Bergue.

Brake for Locomotives.

No. 75873

Patented Mar. 24, 1868.

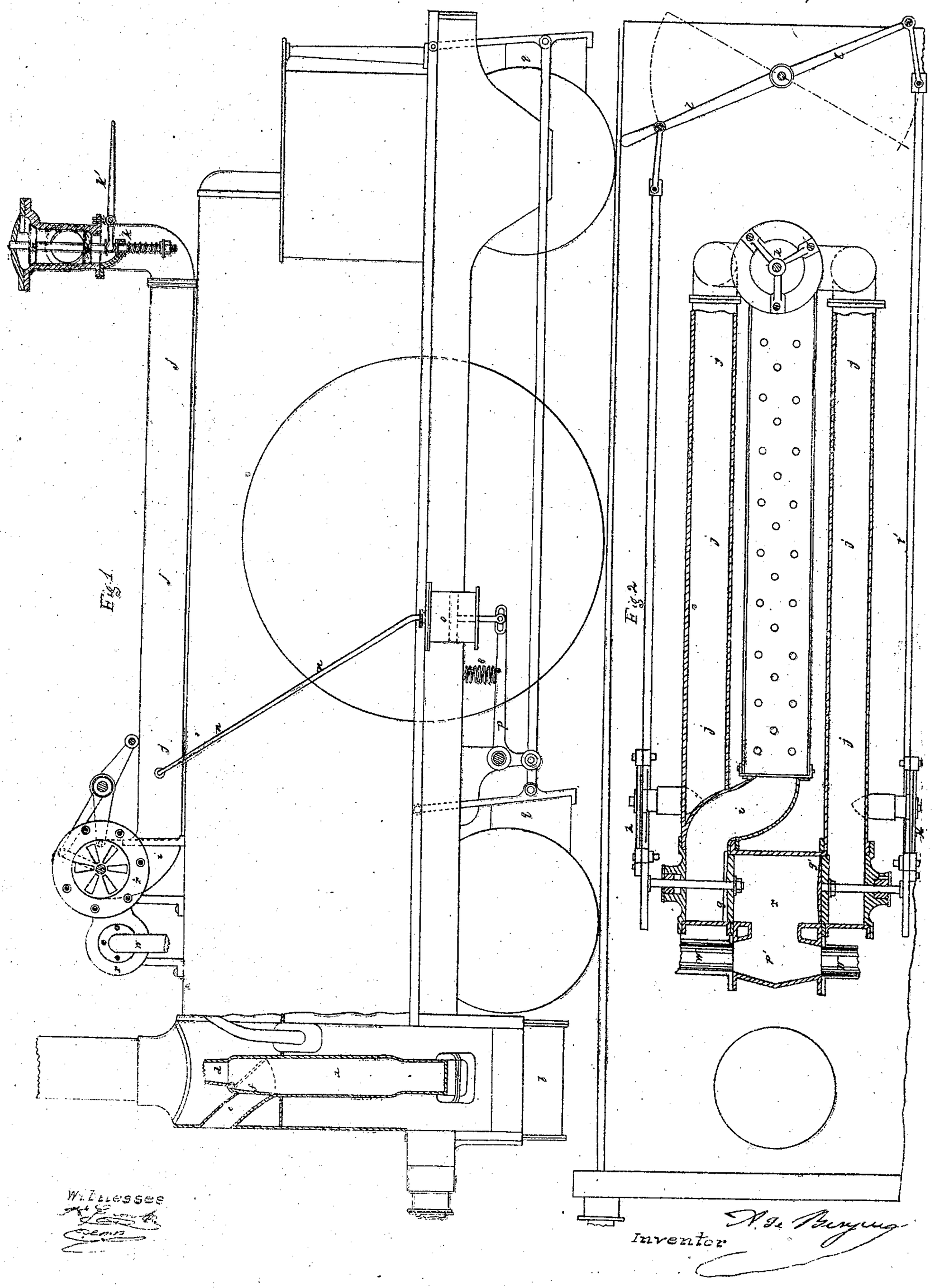

Fig. 1

Fig. 2

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Sheet 2

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Fig. 3

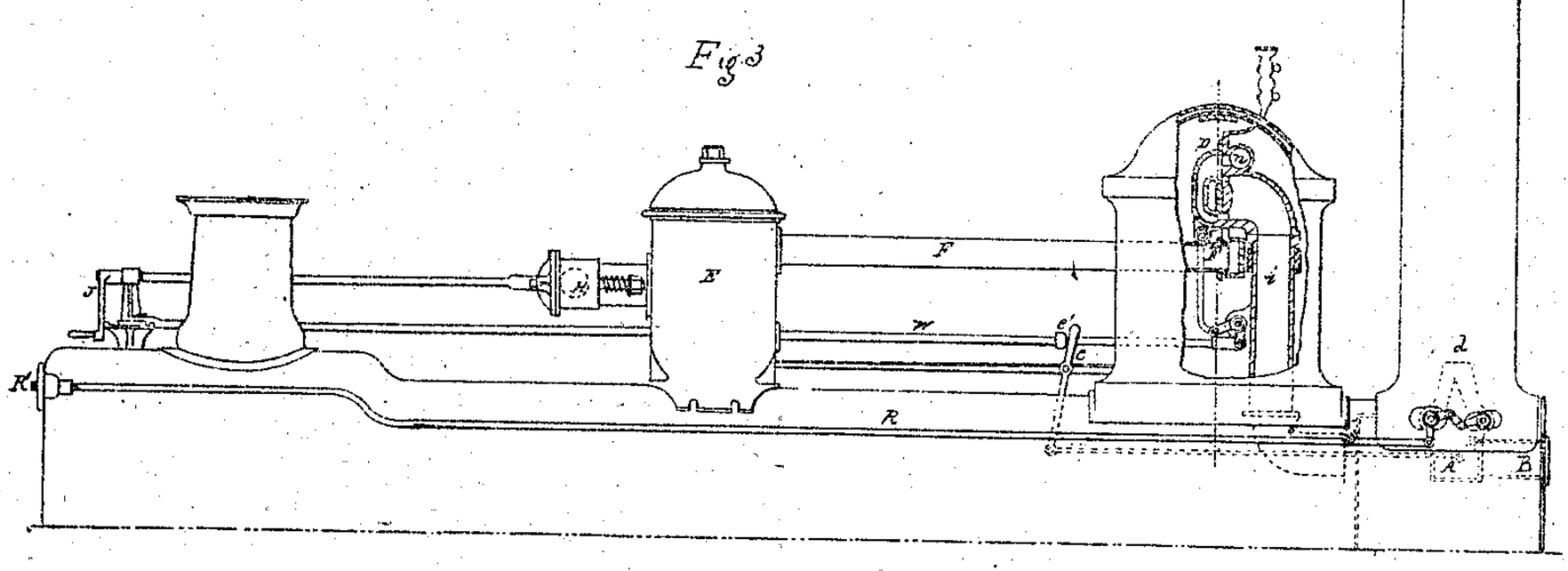


Fig. 4

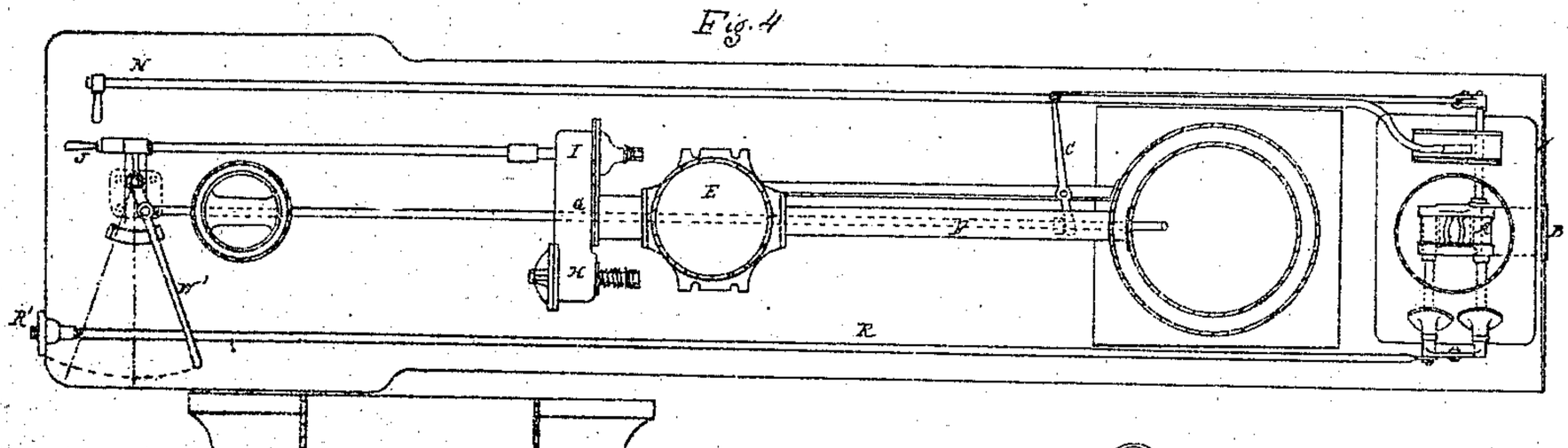


Fig. 5

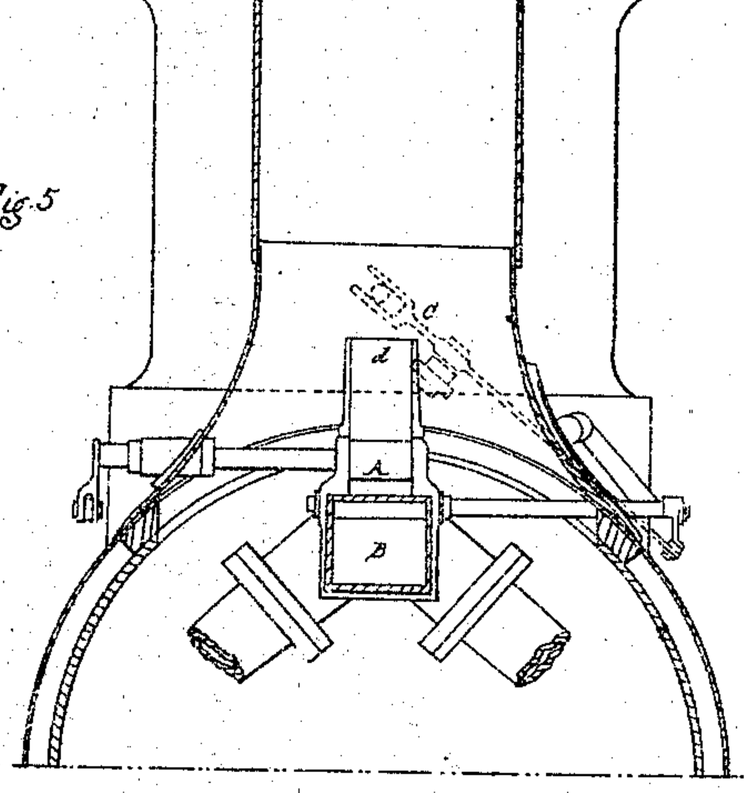


Fig. 6

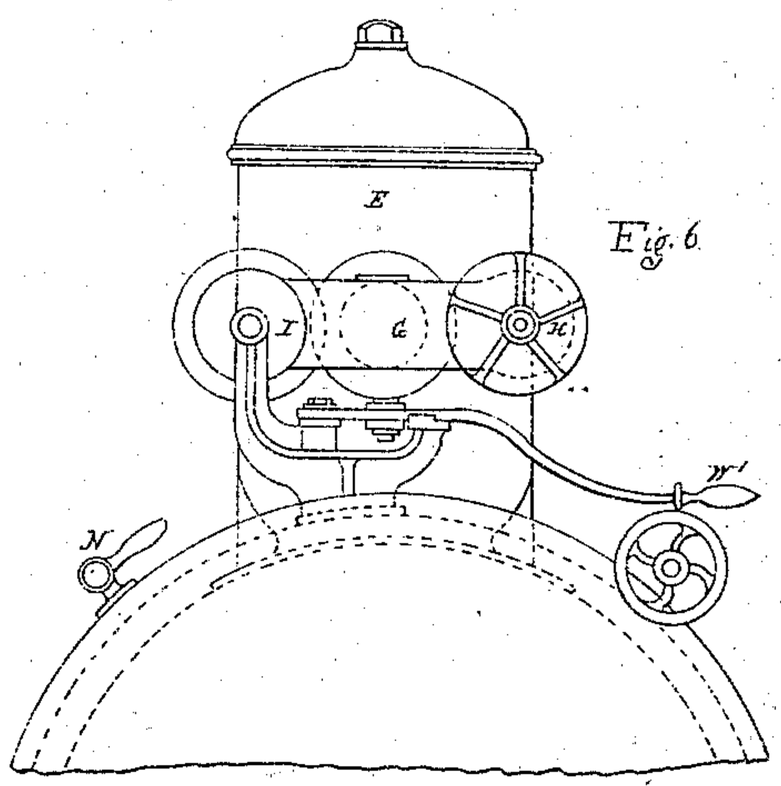


Fig. 7.

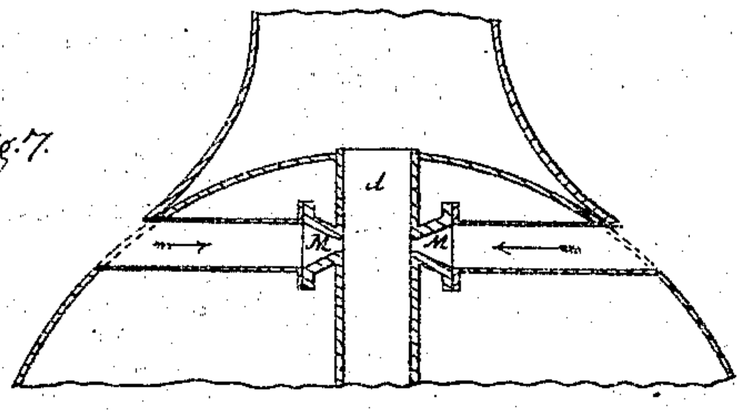
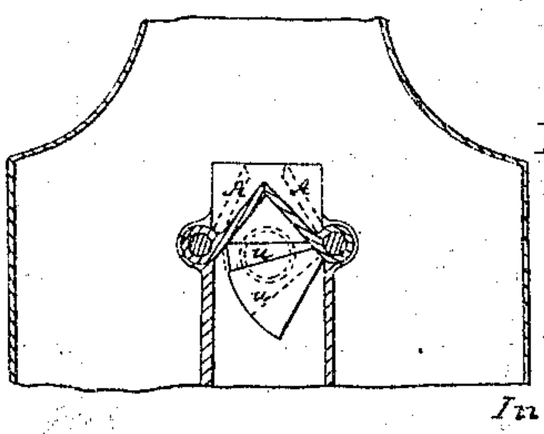


Fig. 8.



Witnesses

Inventor

A. De Bergue

UNITED STATES PATENT OFFICE.

AUGUSTE DE BERGUE, OF PARIS, FRANCE.

IMPROVEMENT IN BRAKES FOR LOCOMOTIVES.

Specification forming part of Letters Patent No. **75,873**, dated March 24, 1868.

To all whom it may concern:

Be it known that I, AUGUSTE DE BERGUE, of Paris, France, have invented a new and Improved Compressed-Air Brake for Cars; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of a locomotive with my improvements attached. Fig. 2 is a horizontal section of the receiver. Fig. 3 is a side elevation of another form of the same improvements. Fig. 4 is a plan of the same. Fig. 5 is a detail front view of the air adit and valves. Fig. 6 is a view of the rear end of an engine, showing the handles by which my improvements are operated and the rear of certain parts of said improvements. Figs. 7 and 8 are sectional views of another arrangement of the air adit and valves.

Similar letters of reference indicate corresponding parts.

The object of this invention is to arrest the motion of railway-cars by the resistance offered to the steam-pistons by compressed air, or the friction of ordinary brakes actuated by compressed air.

The first method consists in providing an adit or air-passage for admitting air to the piston when the latter is in motion, whereby the said air is drawn into the cylinder at each stroke of the piston and forced into a reservoir, where its accumulating tension finally absorbs the momentum of the train by acting against the pistons at each stroke of the latter.

The usual eduction or exhaust pipes are shown terminating in a vertical pipe, *a*, having a reduced extension, *d*, which discharges the exhaust-steam upward into the smoke pipe or funnel C, Fig. 1.

I provide an adit, *e*, for external air, leading into this pipe *a* at any point above the bifurcation of the eduction-pipes, and I also provide a valve, *f*, for opening and closing the same.

When the valve *f* is opened to admit the air into the cylinder it closes the passage of the extension *d*, whereby smoke and carbonaceous particles are prevented from being drawn into the cylinder.

In some suitable locality, as the top of the boiler, I place one or more longitudinal tubes, *j*, to serve as reservoirs for the compressed air. These reservoirs, Fig. 2, open into a receiver, *r*, from whence extend the pipes *w*, leading to the steam-chests of the cylinders *b*. These pipes are either steam-induction pipes when the locomotive is using its steam as a motive power, or air-eduction pipes when the steam is cut off and the cylinders are working air and compressing the same within the reservoir *j*, for the steam escapes from the boiler through a pipe, *i*, leading into the receiver *r*, and thence through said pipes *w* to the cylinder *b*.

The valves *g g'* are disks, more properly of brass, and are seated in the ends of the receiver *r*, as shown. *g* is the valve which admits steam to the cylinders from the boiler when the engine is in operation. *g'* is the valve which admits air from the cylinders to the reservoirs *j* when the cylinders are working air only. These valves are partially-rotating disks, having radial slots on their faces, which are brought to coincide with corresponding radial slots in the plates against which they are in smooth contact when the said valve is to be opened or turned off from such concidence when the valve is to be shut, after the manner of opening or closing the ordinary circular stove-damper. This is one form only of such valves. Other forms can be substituted if found desirable.

The mechanism operating the valves *g g'* consists of the rods *t t'*, connected with the valves by any lever or link device, as that shown at *k* and *k'*. These valves are so set that when the lever *l*, to which the rods *t t'* are connected, is pushed in one direction the steam-valve is shut and the air-valve opened; and the reverse takes place when the lever is pushed in the opposite direction. Thus the valve *g* admits steam to the cylinder, and *g'* admits air to the reservoir *j* from the cylinders, each one being closed when the other is opened.

When it is desired to stop the train already in motion the engine-man will, by the action of the lever *l* and its connections, shut off the steam from the cylinders by the valve *g*, (at the same moment opening the air-valve *g'*,) and, acting upon a rod, will open the air-adit

valve *f*, Fig. 1, which closes the extension *d* in the smoke-funnel, as shown by the dotted outline of the valve. Direct communication is now opened between the cylinders and the external air. He next reverses the steam slide-valves of the cylinders by the ordinary reversing-gear found in all locomotive-engines. The result is as follows: The air is admitted into the cylinders by the vacuum created by the continued motion of the pistons, and is forced into the reservoirs *j*, where it becomes more and more compressed as each stroke of the pistons delivers the cylinders' measure of air into the said reservoir, and the resistance of this element, thus presenting an elastic and increasing tension against the piston, finally brings it to rest, and thus stops the train by a gradual absorption of its momentum. The action of the pistons while working air may be expressed as an air-engine working inversely to the air, the stoppage of the engine taking place by a continuous and increasing resistance, which diminishes the motion of the train in a ratio greater than a geometrical ratio.

My improved brake thus destroys the momentum, not in the abrupt manner of clamping the trucks with a friction-surface, as heretofore used, but with a continuous and increasing resistance, thus avoiding the facets formed on the trucks, as when they are clamped and held rigidly by the brakes heretofore employed, which prevented the trucks from turning, and caused the momentum of the train to be absorbed by their friction on the rails, which friction produces facets on the trucks—a result to be avoided. The brakes are thus under the direct control of the engine-man, who is properly the first one to discover any cause for stopping the train.

A device for utilizing the air thus compressed, to operate as an auxiliary friction-brake, is shown in Fig. 1, where *n* is a pipe leading from the air-reservoir to a cylinder, *o*, having a piston working within it, which is connected to a bell-crank lever, P, as shown. This lever actuates the brake-block *q* in the manner common to ordinary brakes. A spring, *s*, removes the block *q* from contact with the truck or wheel when the brake is in operation. This brake is to be operated by the engine-man, who opens a cock which admits the pressure of the compressed air upon the piston in the cylinder *o*. These auxiliary brakes may be applied to the engine, tender, or any vehicle in the train.

To limit the friction of the block *q* so that it shall not completely stop the revolution of the truck, a spring escape-valve, *m m*, is provided in a chamber communicating with the air-reservoir, as shown at Figs. 1 and 2. This valve is furnished with a spring, *k*, which is determined by calculation or trial with reference to the area of the piston of the auxiliary cylinder *o*, to permit the escape of the air when at a certain tension, the said tension being such as will just admit of the brakes *q* acting on the wheels without stopping them completely, which prevents the formation of facets, as hereinbefore mentioned.

A lever-handle, *k'*, is connected with the valve *m m*, for permitting, at will, the exit of the compressed air from the reservoir when the train has stopped.

I will now describe another modification of the apparatus for accomplishing the compressing of air, and employing the tension thus produced to stop the motion of railway-trains by its reaction against the piston. This modification I consider the better of the two arrangements shown. The principle is identical with that previously shown, but the arrangement of the parts is different.

The Figs. 3, 4, 5, and 6 represent the modification; and similar letters in these figures indicate like parts.

Here the longitudinal reservoir is replaced by a vertical one, E, communicating, by a pipe, F, with a slide-valve, D, within a chamber, as shown. This valve is operated by a rod, *w*, and its bell-crank connecting it with the valve D, as shown at Fig. 3. This rod is pivoted to the lever *w'* within easy reach of the engine-man.

The valve D is at once a throttle-valve for admitting steam to the cylinders, or an air-valve for admitting air from the cylinders to the reservoir E, upon the same principle as that set forth in Figs. 1 and 2, and admits the air and shuts off the steam, or the reverse, according as it is moved up or down.

G is a chamber provided with valves H and I. The first is the safety-valve, arranged to open at a given pressure, and the second is an exit-valve for the compressed air, and is opened by the engine-man. This latter valve is opened by a rod and crank-handle, J. This chamber G communicates with the reservoir E by means of a short pipe, as shown in Figs. 3 and 4.

A are the adit-valves for admitting or shutting out the external air through the adit B. These valves are operated by a rod connecting with the lever C, which latter is moved by a tappet, *c'*, on the rod *w*, whereby the adit-valve is opened simultaneously with the movement of the slide-valve D when it is displaced to shut off the steam to and admit the air from the cylinders.

A single door-valve may be provided to close the extension *d*, leading upward into the funnel, and also to close the air-adit B; or separate valves for the air-adit and exhaust-pipe may be used. Such valves are shown at Figs. 3, 4, and 5, and are operated by a rod, R, and wheel R'. (Shown in Figs. 3, 4, and 5.)

Figs. 7 and 8 exhibit sections of the smoke-funnel having the air-adits and valves differently arranged from the foregoing. The adits (see Fig. 7) are arranged laterally, having conical terminations M opening into the pipe *d*, which are closed by slide-shutters *u u*, pivoted at one side. (See Fig. 8.) The valves A close by bringing their upper edges in contact, as shown.

In order that the steam-cylinders may not become heated by the rapid friction of the pistons, after the steam has been shut off and the air entered therein, I provide a cock opening into the cylinder for admitting a jet of steam into the same to lubricate its interior surface, that the piston may not be subjected to wear or friction. This is an important feature, which I desire to claim especially. The handle and rod operating this cock are shown at N, Figs. 4 and 6.

In Fig. 3 the valve D is shown in section. It operates to shut off or open communication between the air-reservoir E and the cylinders by means of the air-pipes F and *i*, which the ports of the valve connect or disconnect, according as the valve is lowered or raised. The valve, as shown in the drawing, is in its lower position, and is admitting the air from the cylinders to the reservoir E, for the section of the pipe which connects the valve with the pipe F is shown at *n*. A section of the same pipe is again shown on the end of the pipe F, for this pipe *n* passes down laterally on each side of the pipe *i*, the two branches joining the pipe F, the section of which junction is shown at the end of the pipe.

I am aware that the employment of steam to destroy the momentum of railway-trains by reversing the valves is a common expedient, and do not desire to be understood as referring to such means in this application. It is also known to me that compressed air for actuating railway-brakes is an old expedient, and therefore do not refer to such devices broadly; but

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

1. The combination of the external air-adit B and reservoir E with the motive-cylinder and piston of a locomotive, substantially as described and specified.

2. The combination of the rod N with the motive-cylinder, whereby to introduce a jet of steam to lubricate the interior surface of the cylinder while steam is shut off and while air is in the cylinder, substantially as herein shown and described.

3. The combination of the external air-adit B with the exhaust-pipes, funnel, and cylinder of a locomotive, substantially as described and specified.

4. The arrangement of the air-reservoir E, substantially as shown and described, with the motive-cylinders of a locomotive, whereby to receive and retain the compressed air, as set forth.

5. The escape-valve H, substantially as shown and described, in combination with the air-reservoir E and motive-cylinders of a locomotive, whereby to permit the escape of the air, as set forth.

6. The exit-valve I, when combined with the air-reservoir E and motive-cylinders of a locomotive, substantially as shown and described.

7. The arrangement of the valve D, substantially as shown and described, with pipes *i* and F and opening *n*, whereby the motive-cylinders of a locomotive are rendered available in compressing the air, as set forth.

8. The arrangement of the pipe *n* with relation to the air-reservoir E, supplementary air-cylinder and piston *o*, friction-brakes *q*, and arm *p*, substantially as herein described and specified.

A. DE BERGUE.

Witnesses:
JAMES HAND,
DEMOS,
A. GUION.