J. H. GRAY.

Compressed Air Locomotive.

No. 218,730. Patented Aug. 19, 1879.

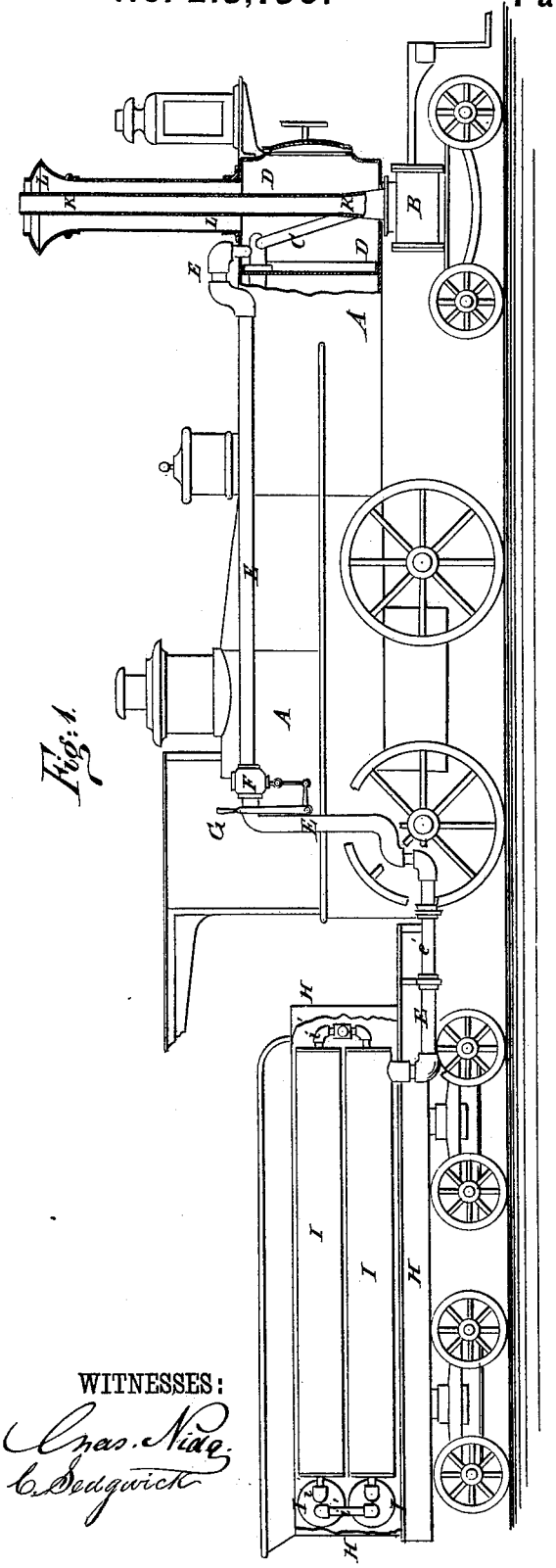

Fig: 1.

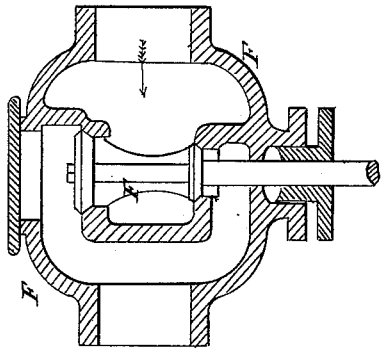

Fig: 5.

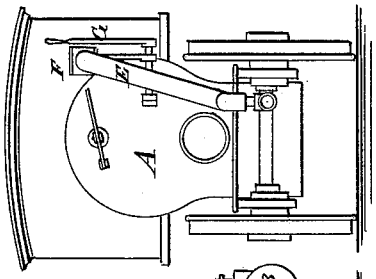

Fig: 4.

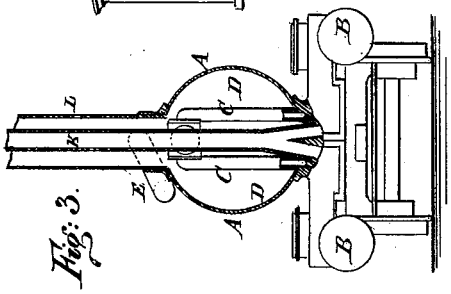

Fig: 3.

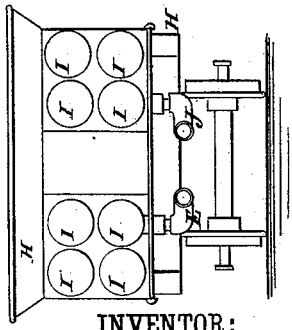

Fig: 2.

WITNESSES:

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UNITED STATES PATENT OFFICE.

JAMES H. GRAY, OF CONNELLSVILLE, PENNSYLVANIA.

IMPROVEMENT IN COMPRESSED-AIR LOCOMOTIVES.

Specification forming part of Letters Patent No. **218,730**, dated August 19, 1879; application filed February 1, 1879.

To all whom it may concern:

Be it known that I, JAMES HARISON GRAY, of Connellsville, in the county of Fayette and State of Pennsylvania, have invented a new and useful Improvement in Compressed-Air Locomotives, of which the following is a specification.

Figure 1 is a side view of a locomotive and tender to which my improvement has been applied, parts being broken away to show the construction. Fig. 2 is a detail view, showing the position of the air-drums upon the tender. Fig. 3 is a vertical section of the smoke-box and stack, and showing the forward ends of the cylinders. Fig. 4 is a rear view of the locomotive. Fig. 5 is a detail section of the air-throttle valve.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish an improved device for attachment to locomotive, marine, and other engines to operate them by compressed air, and which shall be so constructed that the engines may be worked with the air under any desired pressure and for any desired length of time.

The invention consists in the combination of a series of connected air-drums and the conductor-pipe provided with a valve with the steam-pipes leading from the boiler to the cylinders of an engine, and in an engine in which the exhaust-pipe passes up through and projects above the smoke-stack, as hereinafter fully described.

A represents a locomotive-boiler. B are the cylinders, and C are the pipes that conduct the steam from the boiler A to the cylinders B, and which pass through the smoke-box D in the usual way.

With the steam-pipe C is connected the end of a pipe, E, which passes back along the boiler A, and is provided with a balanced valve, F, the two valve-openings of which are made of such a size, in connection with the size of the different parts of the valve-stem, that the same amount of air may pass through each of the said openings. The valve F is opened and closed by a lever, G, at the rear end of the boiler A.

From the valve F the pipe E passes to the tender H, and is connected with a drum, I, placed in the water-tank of the said tender.

The part e' of the pipe E, between the locomotive and the tender, is made of some suitable material that will be air-tight, and at the same time flexible, so that it will not interfere with the movements of the said locomotive and tender.

Any desired number of drums I may be used, and they may be made of any desired length and diameter. The drums I are all connected together by short pipes i', so that the air-pressure may be the same in them all. The drums I are connected by a pipe, J, with air-pumps placed in any convenient position and worked by steam from the boiler A, so as to keep the drums I filled with air compressed to any desired density.

As the compressed air escapes from the cylinders B it passes out through the exhaust-pipe K, which passes up through the smoke-box D and the smoke-stack L, and should be made of such a length that its upper end may project a little above the top of the said stack to prevent the exhaust-air from increasing the draft through the boiler-furnace, and thus causing an unnecessarily rapid combustion of the fuel and an unnecessarily rapid making of steam, as no more steam is required than enough to work the pumps.

The pumps and the cylinders that work them are not shown in the drawings, as there is nothing new in their construction.

If desired, the exhaust-pipe K may be carried out through the wall of the smoke-box D or of the smoke-stack L, so that the compressed air may exhaust into the atmosphere without affecting the draft of the boiler-furnace.

Space must be left around and between the air-drums I in the water-tanks of the tender H to contain so much water as will be required to make sufficient steam to work the air-pumps. No change is made in the construction of the boiler and cylinders of the locomotive or other engine, so that, should any part of the air-compressing apparatus get out of order, the said engine can be worked by steam in the usual way.

I am aware that air has been stored in receivers by a pump and afterward used to propel a train by its expansive power; but

What I claim as new is—

1. A series of air-drums, I, arranged at some distance apart in the water-tank of a steam-engine, connected together by pipes, and by a pipe, J, with suitable pumps operated by the engine, and connected by a pipe along the outside of boiler with the steam-chest and cylinders, as shown and described.

2. The combination, with cylinder and chests, of the pipe E, having a balanced valve constructed and arranged to connect with a lever, G, as and for the purpose set forth.

JAMES HARISON GRAY.

Witnesses:

WILLIAM VANCE,

HENRY GIBSON.