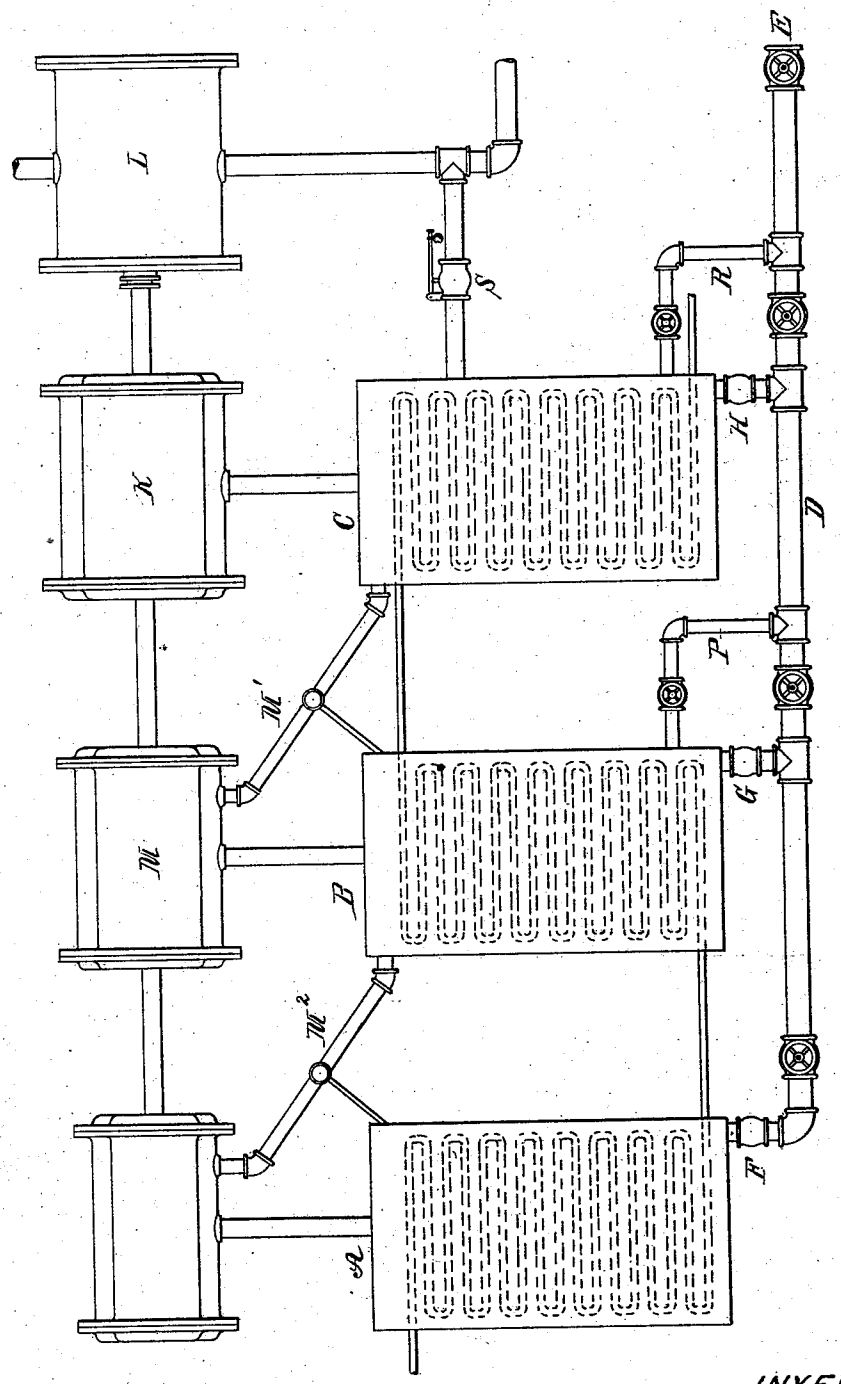
(No Model.)

E. HILL.

LOCOMOTIVE AIR CHARGING APPARATUS.

No. 247,915. Patented Oct. 4, 1881



WITNESSES.

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LOCOMOTIVE AIR-CHARGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 247,915, dated October 4, 1881.

Application filed April 14, 1881. (No model.)

To all whom it may concern:

Be it known that I, EBENEZER HILL, of South Norwalk, in the county of Fairfield and State of Connecticut, have invented new and useful improvements in Locomotive Air-Charging Apparatus for charging pneumatic locomotives and other vessels with air of high pressure, of which the following is a specification.

The present method in use is to have a reservoir charged with air at a higher pressure than is desired to be used, so that when a charge is made to the locomotive or other vessel the reduction in volume will not reduce the pressure below the desired amount for the work. The consequence is that all the air in the reservoir must be compressed to the said excess of pressure, whatever that may be.

The object of this invention is to save this excessive waste of power; and it consists in having a number of reservoirs charged with air at different pressures and connected to a common pipe for charging the locomotive, and provided with check-valves and stop-cocks in such a manner that they may be put in connection in the order of their increased pressures until the last or highest pressure-reservoir is drawn from, by which it is evident that the draft upon the highest reservoir will be limited by as much as the other reservoirs have already filled the space to be charged, and therefore only this last reservoir will require to be charged to the maximum of pressure, and its volume may only be a small proportion of the amount of air required.

The invention also consists in the combination of such a system of reservoirs with air-compressing apparatus and regulating devices that each reservoir will be charged to a certain degree of pressure and then serve as a source of supply to a second compressor, which, when charged to a certain higher degree, will furnish a third compressor with air to supply another reservoir, until the maximum pressure desired is obtained, the entire combination being arranged to operate automatically, as will hereinafter appear.

The accompanying drawing shows in outline a combination and arrangement of devices for accomplishing the objects above set forth.

At A, B, and C are three reservoirs, arranged side by side and each connected to a common discharge or outlet pipe, as at D, to one end of which, as at E, connection is made with the locomotive or tank to be charged with the required air-pressure. The reservoir at A is charged with the maximum air-pressure, and is located farthest from the point of connection at E, and it is provided with a stop-cock, as at F, to let the air into the pipe D. The reservoirs at B and C are charged with the next lowest pressures, and they are each provided with a stop-cock, as at G and H, to admit the air from them into the pipe D. They are provided with check-valves, as at D′, opening toward the pipe D, so that when the air of a higher pressure is let into the pipe D it will not flow into a reservoir of a lower pressure. Now, if a pressure of, say, three hundred pounds be required in the tank for actual work, the reservoir at C may be charged to a pressure of one hundred pounds directly from the first compressing-engine, as at K, (the steam-motor being represented at L,) and when said pressure is reached then the surplus may be conducted to a second air-compressor, as at M, through a pipe, M′, which is provided with a pressure-valve, as fully described in a recent patent granted to me, and which is set to open whenever a certain pressure has been attained, and the air from the compressor at M is charged into the reservoir at B until a certain pressure is reached—say, of two hundred pounds—when a gage opens a valve, as at M^2, and permits the third compressor to supply the third reservoir, which must be charged to the maximum pressure, and by this system can be maintained unless greater drafts are made than the compressors are capable of supplying.

If a locomotive is to be supplied it is connected to the pipe D, outside of the valve at E, and the first cock is opened to admit air from the reservoir at C of the lowest pressure, which when the pressures are equalized the next cock is opened, and the air from reservoir B is thereby let into the tank until its pressure is equalized, when the air from the reservoir at A, having the maximum pressure, is introduced, and of which only a small percentage will be required, as the tank has already been filled with air at pressures up to that of the other reservoirs, and consequently the great resistance or power required to keep a single reservoir filled

to the maximum capacity is saved to the extent of the differences between the pressures of the reservoirs in the system.

If the pipe D leading to the locomotive or other tank to be supplied should be of considerable length, it will contain a large quantity of air at the highest pressure. Consequently, to prevent its being wasted, return-pipes are connected to the pipe D and leading back to the reservoirs B and C, as shown at P and R, and they are provided with stop-cocks, so that after the tank is filled the cock at E is closed and the cock at P opened to let the air return into the reservoir B, which is at a lower pressure than in A or in the pipe D. Then, after the pressure in reservoir B and the pipe D are equalized, the cock at R is opened, and the air from the pipe D returns into the reservoir C until its pressure is equalized, so that there is not any actual loss of air after it has passed the compressors, nor loss of power except under the lowest compression.

To make such a system quite complete I have combined, also, the improvements already granted in a recent patent of returning the overplus of air when the tanks are filled to the steam-pipe, as shown at S, so that the steam will be throttled and the speed of the engine reduced to the minimum required for keeping up the pressures.

It is evident that the apparatus may be arranged in a different form from that shown, and that a greater or less number of reservoirs may be used; but

I claim—

1. The combination of two or more reservoirs connected to a supply-pipe provided with stop-cocks and check-valves for supplying air to locomotives or other tanks for drawing the air first from the reservoir under least pressure, and by which an unnecessary waste of power is prevented, as hereinbefore set forth.

2. The combination of two or more reservoirs with air-compressing engines, whereby variable degrees of pressure may be maintained between the compressors and the reservoirs and with each other, as and for the purposes hereinbefore set forth.

3. The process of supplying tanks with air at high pressures by first charging the tank from a reservoir at the lowest pressure and then from air at a higher pressure, and so on until the maximum degree of pressures is attained, as hereinbefore set forth.

In witness whereof I have hereunto subscribed my name and affixed my seal in the presence of two subscribing witnesses.

EBENEZER HILL. [L. S.]

Witnesses:
EUGENE N. ELIOT,
C. J. HILL.