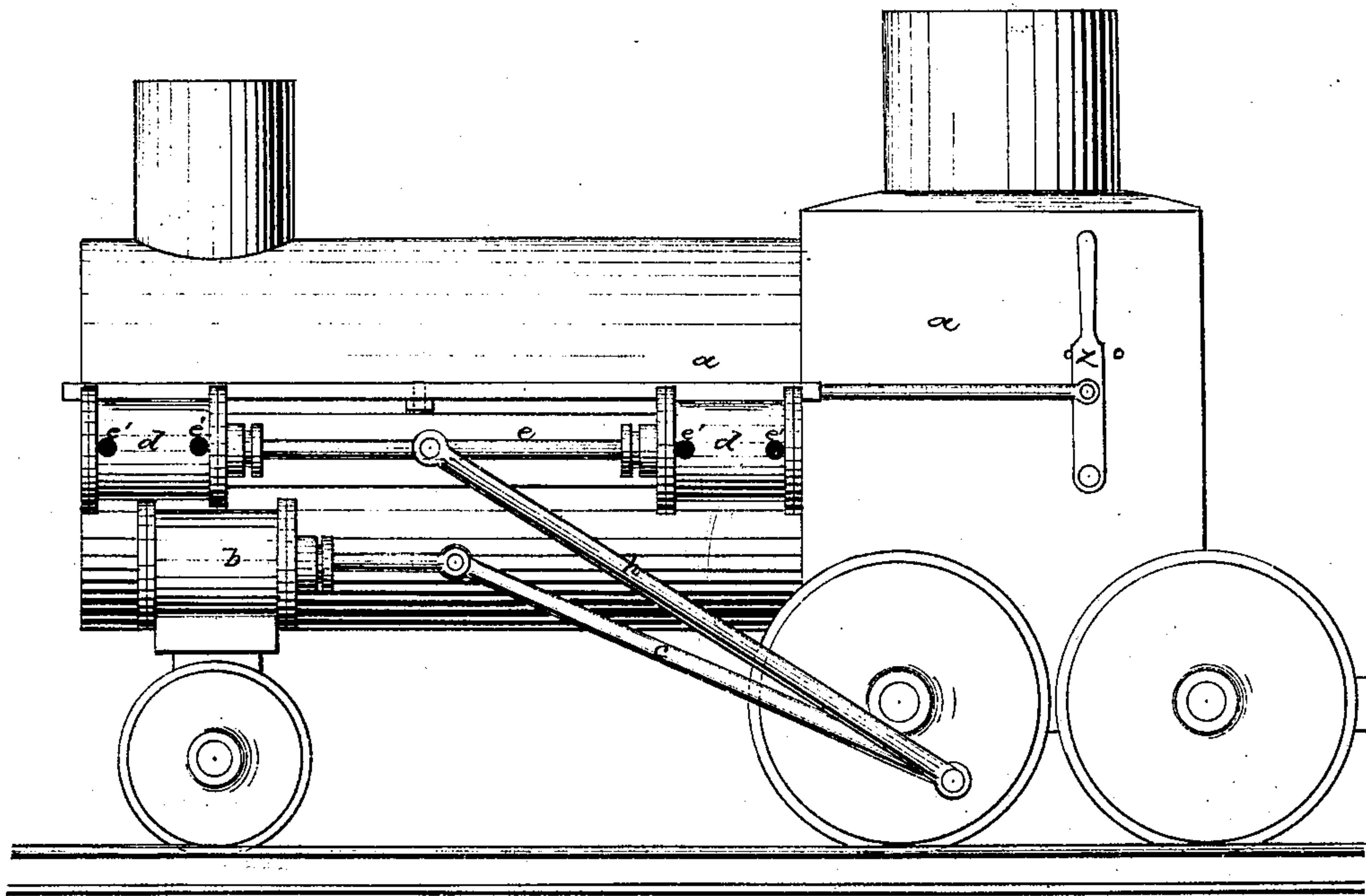


H. F. C. Krumme,

Air Compressor:

No. 101,631.

Patented Apr. 5. 1870.



Witnesses:

Victor Hagonam
G. A. Pettit

Inventor:

H. F. C. Krumme
per *Wm. V. Co.*
Attorneys.

United States Patent Office.

HENRY F. C. KRUMME, OF RIDGWAY, PENNSYLVANIA.

Letters Patent No. 101,631, dated April 5, 1870.

IMPROVEMENT IN STORING POWER IN PNEUMATIC LOCOMOTIVES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, HENRY F. C. KRUMME, of Ridgway, in the county of Elk and State of Pennsylvania, have invented a new and improved Mode of Storing Power; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings forming a part of this specification, in which—

The figure is a side elevation.

This invention consists in an apparatus for enabling a railroad train, when drawn by a pneumatic engine, to bring itself to a halt by the resistance afforded to the pumps connected with the driving or other wheels of its locomotive, and employed in condensing atmospheric air into the main tank, by which process brakes are rendered unnecessary, and power is stored up for drawing the train when it is set in motion again.

In the drawings—

a is a pneumatic railway locomotive.

b is one of the cylinders, connected with the driving-wheel by a rod, *c*.

d d are pump-cylinders, the piston-heads of which are connected by a single rod, *e*.

h is a rod, connecting the piston-rod *e* with the driving-wheel.

The pump-valves are so contrived that, when the driving-cylinders are in operation, the air is allowed to enter and leave the pump-cylinders, by means of the lever *z*, which controls the valves *e' e' e' e'*. Consequently, in this condition, the pumps are not at work; but, when it is desired to stop the train or check its velocity, the communication between the tank of the locomotive and driving-cylinders is cut off by the proper machinery, and the valves *e' e' e' e'* closed by means of the connecting-rod and lever *z*. Thereupon the

pump-cylinders at once begin to condense air in the main tank, and continue condensation until the train stops, or is sufficiently checked. The air thus condensed may be retained in the tank for any length of time, where it is always ready to be utilized in starting and drawing the train again.

The first charge is forced into the tank by means of a stationary steam-engine, or hydrostatic pressure, and the greater its condensation, the less will be the number and caliber of pumps required, for the reason that it will oppose greater resistance to the driving-wheels, and consequently stop the train sooner. The pumps are so arranged that they may be all set at work together, or one after another, lest the shock to the machinery should be too great.

A train weighing two hundred tons, at a velocity of twenty miles per hour, has a momentum of four thousand tons, of which power, (less that expended in the way of friction in checking the train, which would not be over one-third, leaving a residuum of two thousand six hundred and sixty-six and two-thirds tons, or one hundred and sixty-four horse-power,) can be stored in the form of compressed air during the process of stopping. It will be readily perceived how vast is the saving, over the use of steam, effected by my invention.

Having thus described my invention,

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

The method of storing power in locomotives driven by compressed air, as described.

H. F. C. KRUMME.

Witnesses:

CHAS. A. PETTIT,

T. P. SIMPSON.