S. Carson,

Air Engine,

No 16,220. Patented Dec. 9, 1856.

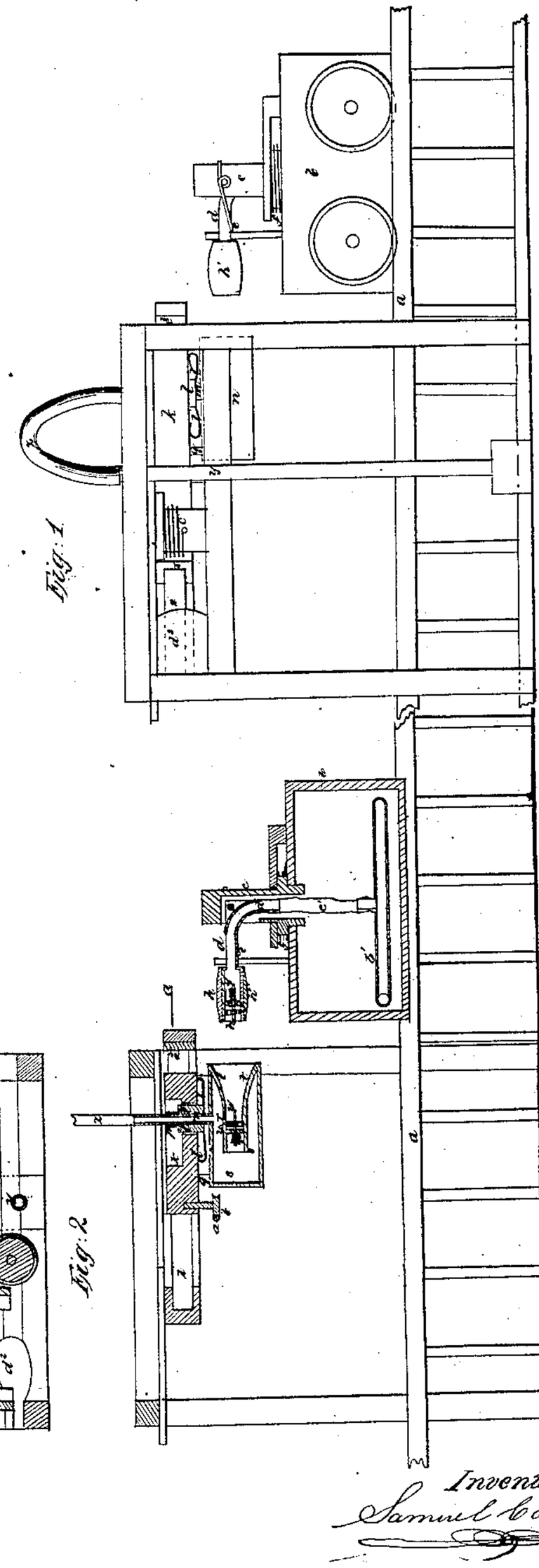

Fig: 1.

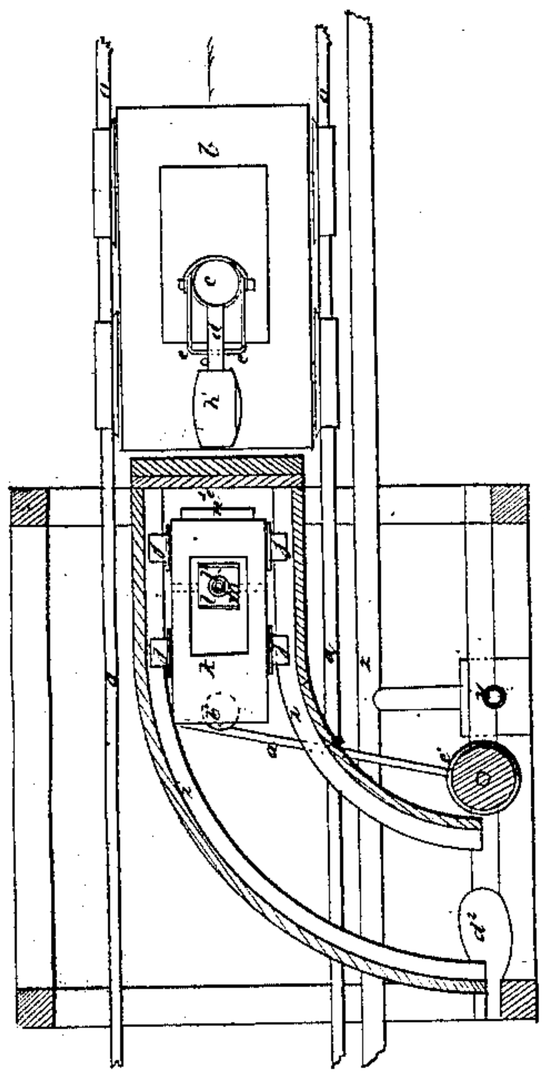

Fig: 3

Fig: 2

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METHOD OF CHARGING THE RECEIVER OF A LOCOMOTIVE WITH COMPRESSED AIR FROM FIXED STATIONS.

Specification of Letters Patent No. 16,220, dated December 9, 1856.

To all whom it may concern:

Be it known that I, SAMUEL CARSON, a subject of the Queen of Great Britain, but now residing in the city, county, and State of New York, have invented a new and useful Method of Propelling Cars or Carriages on Railways, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side elevation of a rail road with my invention applied; Fig. 2 a longitudinal vertical section; and Fig. 3 a horizontal section taken at the line A, *a*, of Fig. 2.

The same letters indicate like parts in all the figures.

It has long since been proposed to propel locomotives by the expansive force of atmospheric air or other permanently elastic gas compressed into suitable receivers on the locomotives, and to be recharged at given stations along the line of the railroad by stopping the locomotive and connecting the receiver or receivers with air pumps at the stations operated by steam engines or other motors; but this plan is defective in consequence of the great waste of time consumed at the several stations, which of necessity must be numerous.

The object of my invention is to avoid the defects presented by the method above referred to and to this end my invention consists in forming a connection between the receiver of the locomotive and the supply pipe containing the compressed atmospheric air or other gas, and maintaining such connection for a sufficient length of time but while the locomotive continues to move, to charge the receiver with compressed air or other gas to propel it to the next charging station, by means of which I avoid the inconvenience and loss consequent upon the transportation of fuel and water on the present system of steam locomotives, while at the same time I avoid the necessity of stoppages for supplies along the line of the road.

In the accompanying drawings (*a*, *a*,) represents the two rails of a railroad of any suitable construction, and (*b*) a locomotive provided with suitable driving wheels to be operated by any suitable engine to be impelled by the elastic force of compressed air or other permanently elastic gas. It is not deemed necessary to describe and represent the engine and other mechanism as these make no part of my invention. This locomotive is also to be provided with a receiver (*b'*) of any suitable construction and capacity to contain a charge of compressed air to propel the carriage alone, or if desired, with a train of cars linked to it, from one charging station to another.

To the upper part of the locomotive is to be connected the lower end of a vertical pipe (*c*) by means of a joint which will admit of the said tube turning on its axis about one half of a revolution. The upper end of this pipe is closed, and near its upper end one end of a horizontal pipe (*d*) is connected by a joint which will admit of the outer end having a slight play up and down; and the inner end (*d'*) of the horizontal pipe is bent down within the pipe (*c*) and is then connected with the receiver (*b'*) within the locomotive by a flexible pipe (*e'*) or any equivalent means to admit of the free turning of the horizontal pipe. The pipe (*d*) is maintained in a horizontal position, or nearly so, by resting on a spring (*e*) which will however yield to any force which might do a serious injury to the apparatus. And there is a coiled spring (*f*), or other equivalent therefor, which connects the vertical pipe (*c*) with the locomotive so that when the end of the horizontal pipe (*d*) is turned around with the vertical pipe the spring will yield and then draw back the pipes to their original position with the open end of the horizontal pipe in front. The front end of the said horizontal pipe is provided with a valve (*g*) which closes outward against a seat at the forward end of the pipe, the said valve having a projecting stem (*h*) so that when the stem strikes any thing by the forward motion of the locomotive the valve will be opened. The outer diameter of this pipe at the forward end is provided with india rubber or other suitable packing (*h'*) for a purpose to be presently described. At given and determined distances along the line of the road there are what I term charging stations to charge the receiver of the locomotive or power car with compressed air or other gas in sufficient quan-

tity to propel it alone or with a train, from one charging station to another. The description of one of these stations will suffice as they may be all alike.

Immediately over the rail road track I erect a suitable frame work to carry ways (*i*, *i*) which for a short distance are straight and vertically over the central part of the rail road track, and then the said ways curve off to one side as represented in the drawings. To these ways are fitted flanched wheels or rollers (*j*, *j*, *j*, *j*) of a small charging carriage (*k*) so that the said carriage shall run on the said ways freely. In the sides of this carriage are mounted the journals or trunnions of a shaft (*l*) with a large hole in the middle and at right angles with its axis, to which hole is fitted in the manner of a journal a tube (*m*) the lower end of which is attached to a cylinder (*n*) so that when the cylinder lies in a horizontal position the tube (*m*) will be vertical or nearly so, but as the tube (*m*) turns in the shaft (*l*) and the trunnions of the shaft (*l*) turn in the carriage at right angles to the axis of the tube, the cylinder at the lower end of the tube is capable of turning as it were on a universal joint. The shaft *l* however is provided with a spring *i* the ends of which bear against the under surface of the carriage *k* to maintain the cylinder in a horizontal position unless there be some disturbing cause to change it from that position and then the spring will yield and restore it to its required position. And there is a spring *p* coiled around and attached to the upper end of the tube *m* and in turn attached to the shaft *l* the tension of which spring will maintain one end of the cylinder against a stop *q* with its axis in the line of the central longitudinal vertical plane of the carriage so that when the carriage *k* is on the straight part of its ways the axis of the cylinder shall be in a vertical plane centrally between the rails of the road. But the elasticity of this spring will permit the cylinder to be turned horizontally in one direction. The rear end of this cylinder is closed and the forward end open and without it there is a smaller and shorter charging cylinder *r* leaving a considerable space *s* between the two.

The forward end of the small cylinder is bell mouthed as at *t* and connected air tight with the open end of the large cylinder, and the inner end is formed into a valve seat *u* fitted with a valve *v* on a stem *w* which slides in suitable supports. The tube *m* communicates freely with the space *s* between the two cylinders, and when the valve *v* is opened, with the inside of the small cylinder.

The upper end of the tube *m* is connected by means of a flexible tube *x* with a stationary pipe *y* which communicates with a large supply pipe *z* laid along the side of the track. The supply pipe is to be supplied with compressed air by pumps operated by suitable motors at suitable distances apart along the line of the road so that one pump or set of pumps at one station may supply compressed air to several charging stations or there may be one pump or set of pumps at each charging station.

Now supposing the supply tube to be suitably charged with compressed air or other permanently elastic gas at a suitable pressure, and the locomotive to be moving in the direction of the arrow, as it approaches one of the charging stations the forward end of the pipe *d* enters the bell mouth *t* which guides it into the small charging cylinder *r*, the elastic packing on the pipe *d* fitting the bore of the cylinder so accurately as to make an air tight joint. The moment the valve stem on the pipe *d* strikes the stem *w* of the valve *u* at the bottom of the cylinder *r* both valves are opened and the compressed air rushes from the supply pipe into the receiver of the locomotive and charges it with compressed air at a sufficient pressure to operate the engine of the locomotive and propel it to the next charging station and so on along the entire length of the road. This charging of the receiver takes place while the locomotive is and continues in motion, and this is done in the following manner. As the locomotive moves along, the pipe *d* first enters the bell mouth of the cylinder as already described, the said cylinder with its carriage begins to move on its ways and continues to move as the valves are opened and the compressed air is transferred. The carriage of the charger cylinder at first moves in a line parallel with the rail road and then gradually curves off, and as it curves off the cylinder turns with its carriage, the pipe *d* at the same time turns on the locomotive to adapt itself until both reach about a right angle to the line of the railroad, and then the pipe *d* of the locomotive begins to move out of the cylinder of the charger which permits the two valves to close and shut off the communication before the pipe *d* leaves the cylinder, the said pipe *d* continuing to turn on the locomotive, and the cylinder also turning on its carriage to adapt itself to the changing position of the pipe *d* until it is entirely out. And when this takes place the charge carriage is immediately carried back to its original position to be in readiness for another locomotive, which back motion is induced by an arm *a′* which acts on a roller *b″* on the end of the carriage *k*. This arm projects from a vertical shaft having a coiled spring *c′* which is contracted by the force of the locomotive as it forces the carriage *k* forward during the charging operation. The spring is in this way sufficiently contracted to

carry back the carriage to its original position; but I prefer to aid it by an elastic bumper d^2 which also aids in arresting the momentum of the charger carriage. There should be another elastic bumper e^2 at the other end of the ways to arrest the momentum of the carriage k when forced back to its original position. Instead of the spring arm for forcing back the carriage k a counter weight or other equivalent means may be substituted.

It will be obvious from the foregoing that for a double track road there should be two sets of charging stations one set for each track. But if desired locomotives may be run in opposite directions on one track by having two sets of chargers arranged in opposite directions, and on opposite sides of the track, by either turning the locomotive at the terminus of the road or by making the pipe d or its equivalent so that it can be shifted from side to side. I do not wish to be understood as limiting my claim of invention to the special construction and arrangement of the parts as these may be greatly varied within the range of my invention by the substitution of analogous or equivalent means.

I do not wish to be understood as making claim to the propelling of locomotives on rail roads by the elastic force of compressed air or other permanently elastic gas, nor to the charging of compressed air or gas into the receiver of a locomotive at given stations along the line of the rail road when this is done by stopping the locomotive to connect its receiver with the supplying apparatus as these have long been suggested and described.

What I claim as my invention is the method, substantially as herein described, of charging the receiver of a locomotive with compressed air or other permanently elastic gas from fixed stations while the locomotive is in motion and passing the station, by means of the self-adapting apparatus, substantially as herein described or equivalents therefor.

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Witnesses:

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