

(No Model.)

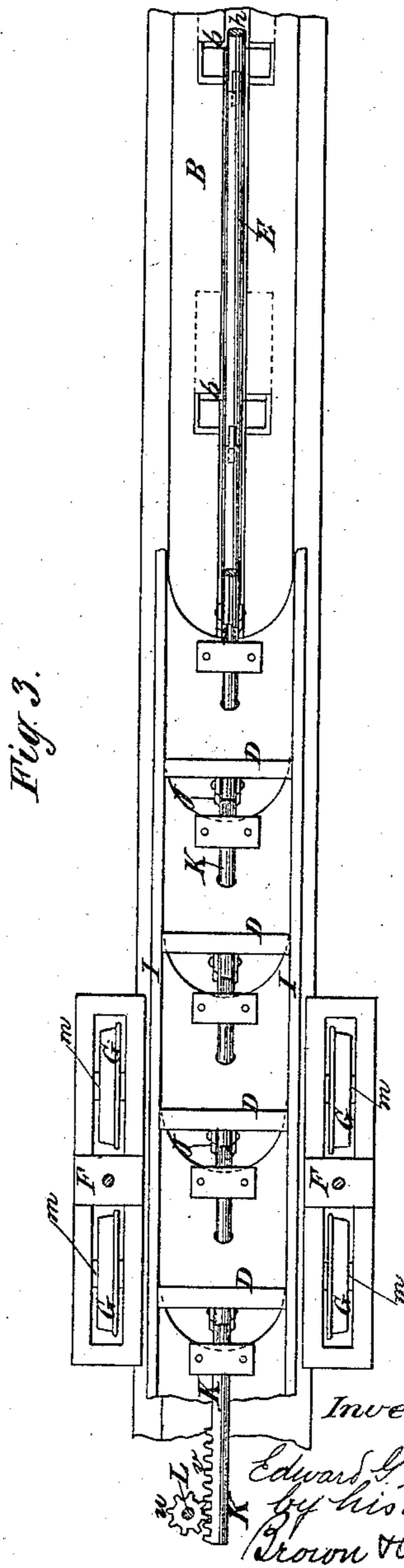
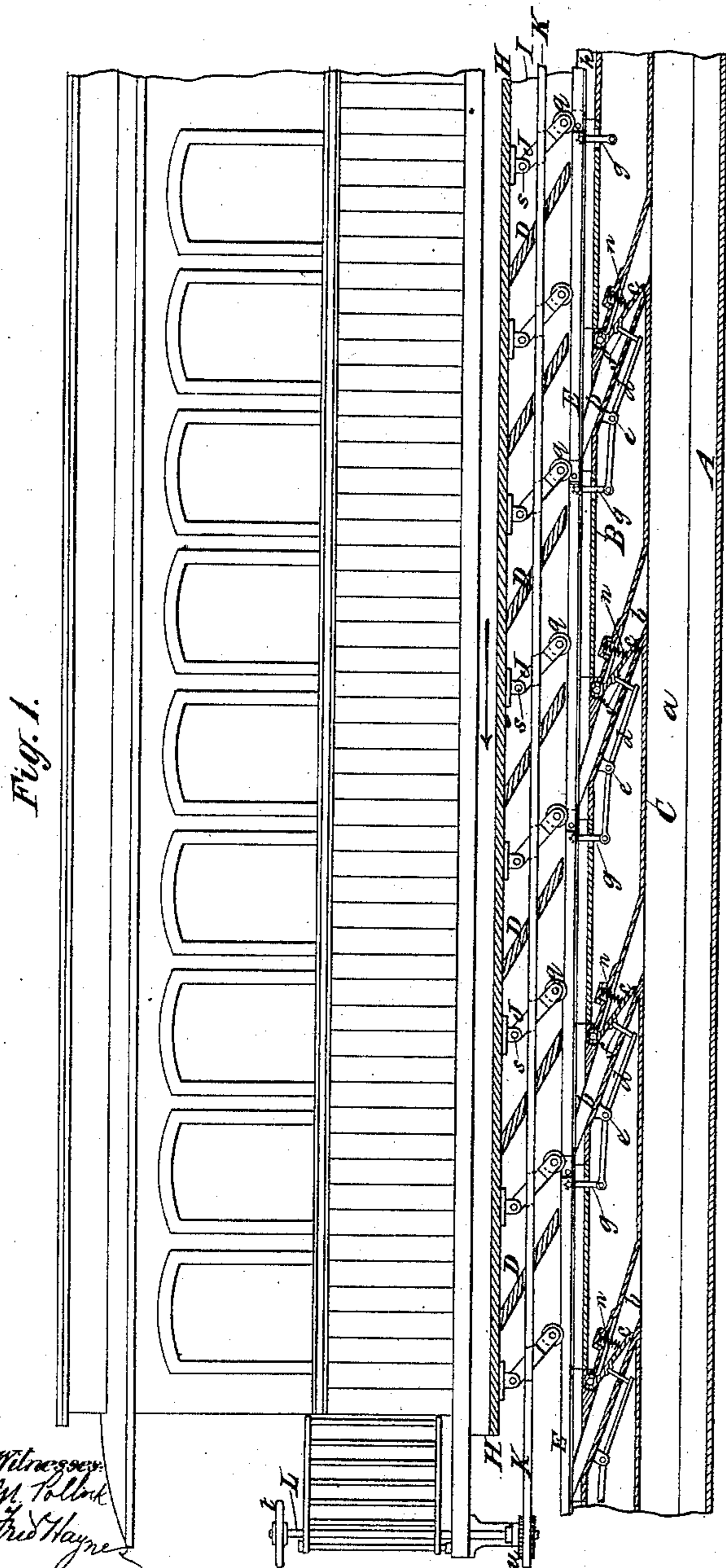
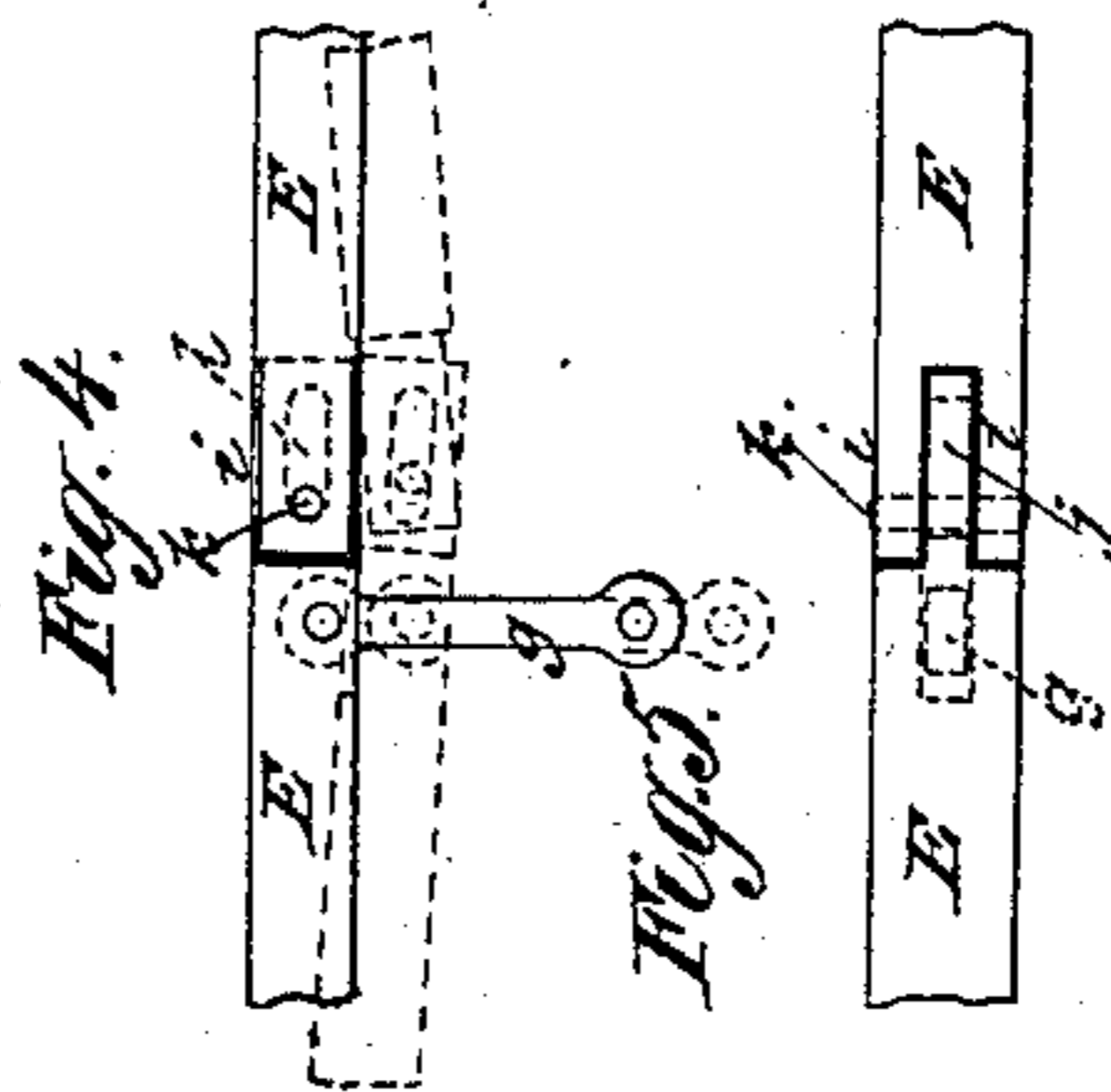
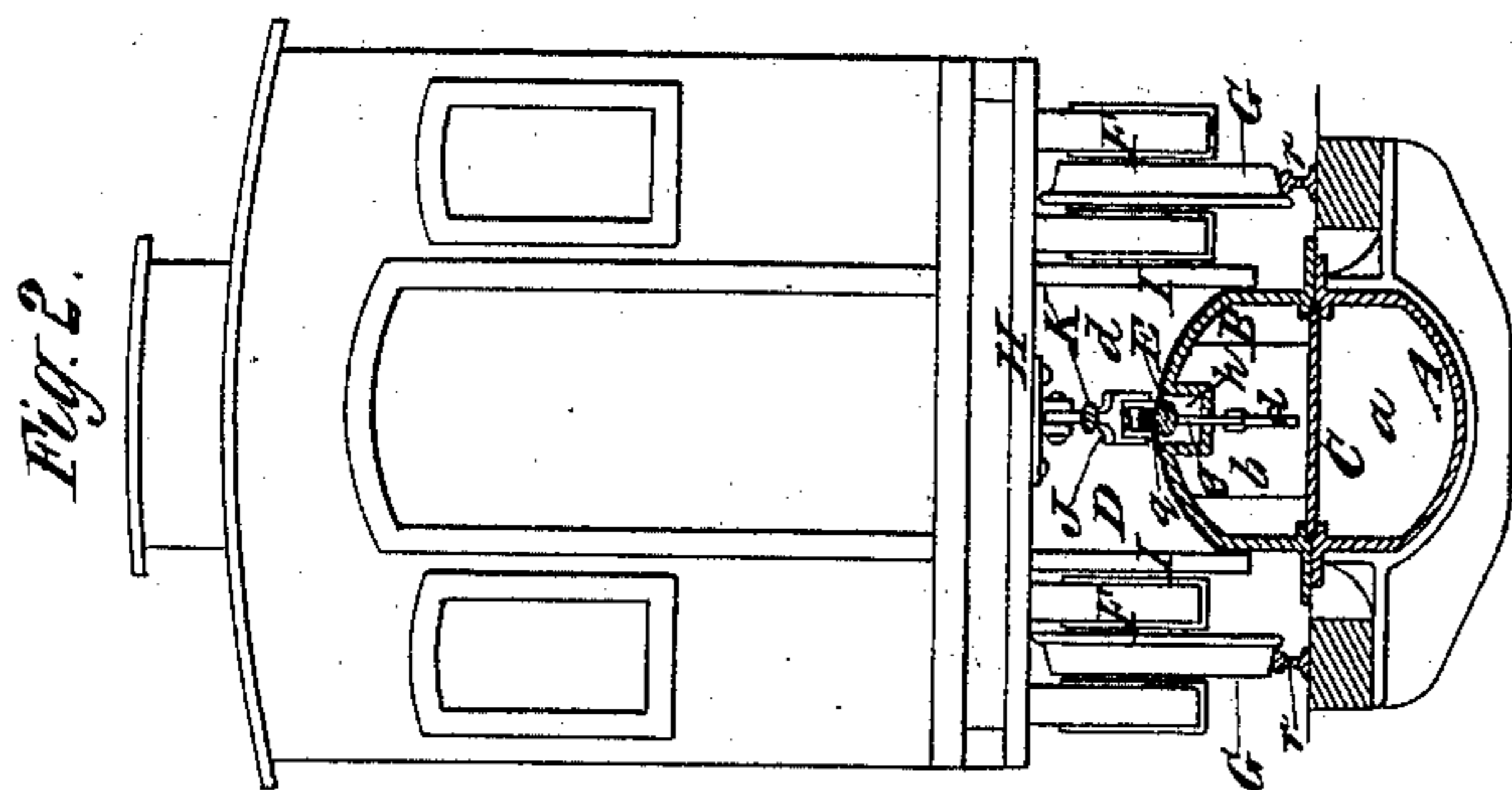
2 Sheets—Sheet 1.

E. G. SMITH.

MEANS FOR PROPELLING CARS UPON RAILWAYS.

No. 319,335.

Patented June 2, 1885.



(No Model.)

2 Sheets—Sheet 2.

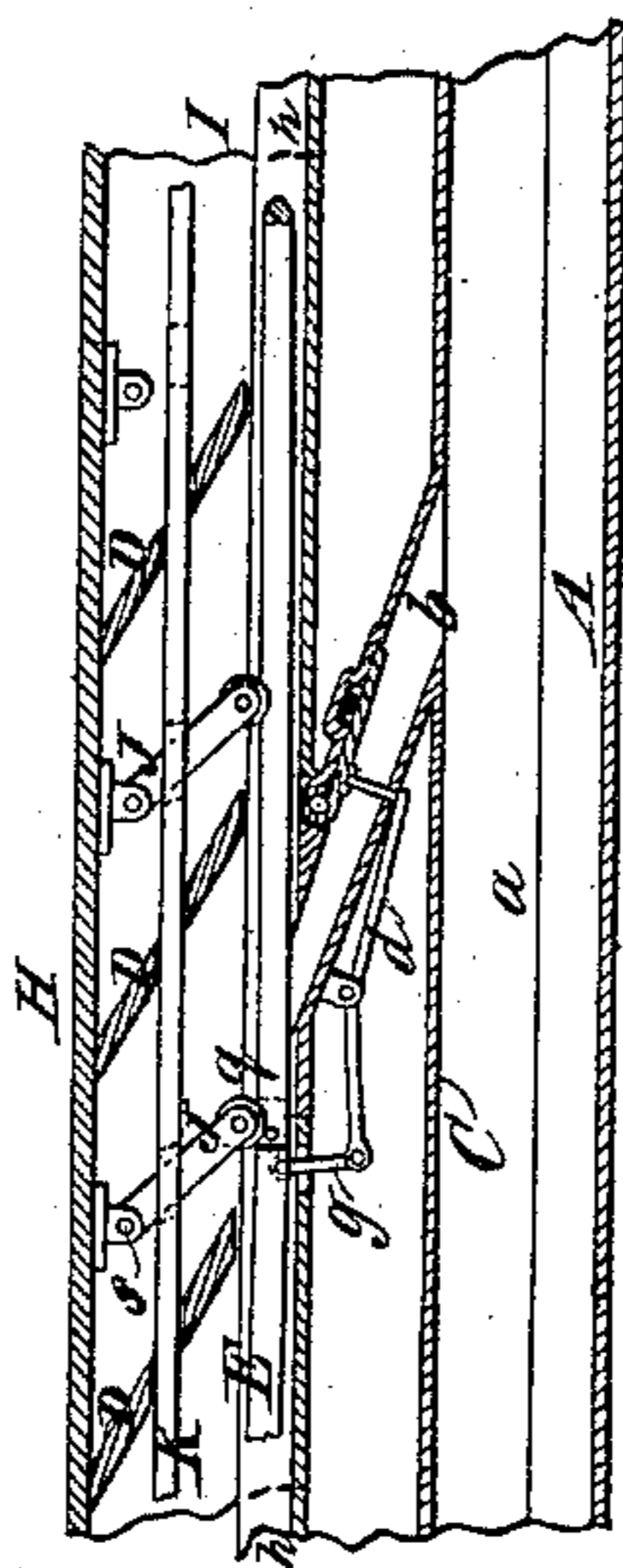
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No. 319,335.

Patented June 2, 1885.

*Fig. 6.*



*Witnesses:*

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*Geo. Haynes*

*Inventor:*

*Edward G. Smith*  
*by his attys*  
*Brown & Hall*

# UNITED STATES PATENT OFFICE.

EDWARD G. SMITH, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO  
LUDOLPH A. FULLGRAFF, OF SAME PLACE.

## MEANS FOR PROPELLING CARS UPON RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 319,335, dated June 2, 1885.

Application filed April 7, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD G. SMITH, of the city and county of New York, in the State of New York, have invented a new and useful  
5 Improvement in Means of Propelling Cars on Railways, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to the propulsion of  
10 cars or vehicles on railways by means of compressed air issuing from a stationary tube or conduit situated in the track, and acting upon a series of buckets or abutments attached to the car or vehicle.

15 The invention consists in a novel construction of the said tube or conduit and of the said system of buckets, and a novel combination of said tube or conduit and system of buckets, whereby they so adapt themselves to each  
20 other as to avoid any considerable escape of air from between them.

It also consists in novel means whereby the car or vehicle in its passage over the track is made to control the issue of compressed air  
25 from the said tube or conduit to act upon the said system of buckets or abutments.

The invention also consists in certain details, hereinafter described.

Figure 1 in the drawings exhibits a side view  
30 of a railway-car and a longitudinal section of the compressed-air tube and its appurtenances, and of the buckets and means of closing the outlet-valves of the said tube. Fig. 2 exhibits an end view of the car and a transverse section  
35 of the compressed-air tube and of the valve-opening mechanism attached to the car. Fig. 3 is a plan of the air-tube and of part of the car attachment for operating in combination therewith. Fig. 4 is a side view, and Fig. 5 a  
40 top view, of part of a jointed rod for operating the valves. Fig. 6 is a longitudinal sectional view of part of the air-tube and one of its spouts and valves and of some of the buckets attached to the car.

45 A B C designate the air-tube, which is arranged in the track between and partly below the rails *r r*. This tube is represented as made of cast-iron and composed of three portions—viz., lower and upper flanged portions, A and  
50 B, which may be of any convenient transverse

sectional form, and a horizontal partition, C, which is placed between the said flanged portions and secured by the bolting together of the flanges of those portions. The space *a* below the partition C forms the continuous con- 55  
duit for compressed air, which is supplied to the said conduit at either end for the purpose of propelling the cars. The partition C has cast with it the outlet-spouts *b b* for the issue of the compressed air from the conduit *a*. These 60  
spouts have an upward inclination toward the direction in which the cars are to be propelled, as shown in Fig. 1, wherein an arrow is represented to indicate such direction. The upper  
portion, B, of the tube is a mere shield to the 65  
spouts *b b*, the mouths of which terminate in openings in the top of said shield, which forms a continuous surface, fitting to the edges and mouths of the buckets D H I D H I, which are  
70 attached to the cars to receive the impact of the compressed air issuing from the said spouts, and which will be hereinafter more fully described. The tube A B C should be  
75 sustained in a fixed relation to the track, and for this purpose both may be supported, as shown in Fig. 2, upon iron cross-ties, in which  
there is a seat, into which the said tube fits. Each spout *b* is fitted with a hinged valve, *c*,  
80 to which is applied a spring, *n*, by which it is closed, as shown in Fig. 1, and for the opening of which a lever, *d*, is applied on a fixed fulcrum, *e*, under the spout. One end of this  
85 lever acts against a pin, *f*, passing through a hole in the under side of the spout, to open the valve, and the other end is connected by a link, *g*, passing through a hole in the shield  
B, with a jointed sectional bar, E, which extends the whole length of the track, where it  
90 is supported by the several links *g g*, being arranged within a longitudinal recess, *h*, provided along the top of the shield B, as shown in Fig. 1. The adjacent ends of sections of  
this bar E are fitted together with loose mortise-and-tenon joints, as shown at *i j* in Figs.  
4 and 5, and the connection at each joint is 95  
made by a pin, *k*, inserted tightly into one portion of the joint, and passing through a slot, *l*, in the other portion, such connection permitting the flexure of the joint, as indicated in dotted outline in Fig. 4, and the elon- 100

gation of the bar consequent on such flexure. The links *g* are connected with the said bar *E* close to the joints, the sections of the bar being severally of a length equal to the distances  
 5 between the said links and between the centers of the mouths of the spouts. The buckets may be attached to the bottom of the car in any convenient or suitable manner; but, as it is preferable that they should not require any  
 10 addition to the height of the car, I have represented the running-gear of the car as consisting of narrow side trucks, *F*, as shown in Figs. 2 and 3, which do not extend across the track, but each of which contains wheels *G G*  
 15 for one side of the car only, the said wheels each having a short independent axle, *m*, of its own, which has both its boxes in its own side truck, and does not extend across the track. With the running-gear thus constructed the buckets are permitted to be arranged  
 20 between the wheels and to fit close to the mouths of the spouts and to the crown of the shield *B*, the lower edges of the buckets being shaped to conform to the said crown, which is thus made to prevent the escape of air at the  
 25 said edges.

I have represented the buckets as constructed upon or with a horizontal board, *H*, placed at a short distance below the bottom of the  
 30 car-body. This board may be suspended from the floor-frame of the car, or may be supported, as shown in Fig. 2, directly upon the trucks and have the car-body supported upon it. The car-springs may in the latter case be between  
 35 the said board and the car-body, or in either case may be applied in the trucks on the axle-boxes in the usual way.

The series of buckets consists of the horizontal board *H*, two upright boards, *I I*, attached to said board *H*, and a series of abutments, *D D*, placed across the board *H* between the two boards *I I*.

Each bucket consists of an abutment, *D*, a portion of the board *H*, and portions of the  
 45 two side boards, *I I*, which latter are shown in Fig. 2 as lapping the sides of the shield *B*. These side boards are shown in Fig. 3, where the board *H* is omitted from that part of the bucket structure which is represented. The  
 50 several buckets will not be air-tight, because the boards *I I* will not fit tightly against the sides of the shield *B*, nor will the lower edges of the abutments *D* fit tightly the top of the shield *B*. Air may also escape from the buckets through the longitudinal recess *h* in the  
 55 top of the shield. The buckets will therefore have ample vent, and pressure will be prevented from accumulating in them, the air acting only by its impact on or in the buckets to  
 60 move the car.

I may here remark that I do not confine myself to any method of attaching the buckets to the car or to any arrangement of running-gear. In every bucket there is suspended  
 65 from the board *H*, or from any fixed part of the bucket structure, by a pivot, *S*, an inclined hanger, *J*, to the lower end of which is piv-

oted a roller, *q*, which is capable of pressing on the jointed sectional rod *E*, and all of these hangers are connected with a rod, *K*,  
 70 which runs the whole length of the car through holes in the buckets *D D*, and which is so prevented from moving upward and downward, but permitted to be moved longitudinally by means of an upright shaft, *L*, situated on the  
 75 platform of the car, and which has on its upper part a hand-wheel, *t*, and on its lower part a pinion, *u*, which gears with a rack, *v*, on the said rod, as shown in Figs. 1 and 3. By moving the rod *K* longitudinally in one direction  
 80 or the other the hangers *J J* may be raised and lowered, so that their rollers may press on the jointed sectional bar *E* in such manner as to produce the downward flexure of its joints, as shown in Figs. 4, 5, and 6, and so produce  
 85 through the links *g* the opening of the valves *c c* in the air-spouts *b*, or that the rollers may be so raised as to stand just above the bar *E* without depressing it, and allow the valves *c c* to be kept closed by their springs.  
 90

The connection of the rod *K* with the hangers may be made in various ways, but is shown as made by simple slots in the rod, through which the hangers pass, and in which they fit so as to have only just sufficient freedom of  
 95 motion to permit their necessary movement. When the shaft *L* is turned to a position to cause the rod *K* to hold up the hangers *J* high enough to allow the sectional bar *E* to rise to a straight position and allow the valves *c c* to  
 100 be closed by their several springs, as shown in Fig. 1, the apparatus is inoperative; but on the shaft *L* being turned to a proper position the rod so depresses the hangers *J* as to cause them to produce the downward flexure  
 105 of such of the joints of the said bar as they are over, as shown in Fig. 4 in dotted outline, and as also shown in Fig. 6, and thereby to produce the opening of the several valves connected with the said bar near said joints. The  
 110 compressed air, being thus allowed to issue from the spouts or outlets *b b* of the air-tube, enters the buckets, and by its impingement upon the abutment at the front thereof produces the propulsion of the car, and as the car  
 115 moves forward and the hangers advance along the sectional bar they continue to open the valves of the spouts under the car and permit the closing of those in the spouts which the car leaves, and the propulsion of the car is  
 120 continued all along the line. To stop the car, the rod *K* is moved in a direction to raise the hangers and permit the closing of the valves, and brakes may be also applied in the usual or any suitable manner.  
 125

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

1. The air-tube composed of the lower portion, *A*, containing the air-duct *a*, the partition *C*, with the attached spouts *b b*, and the  
 130 shield *B*, the whole combined substantially as herein described.

2. The combination, with an air-tube placed lengthwise of a railway-track, and having in

it at intervals outlets furnished with valves, a railway-car having attached to it a series of buckets, a flexible sectional bar arranged lengthwise of the track and connected with  
5 said valves, and a device attached to the car for the purpose of producing the flexure of said bar for operating the said valves, substantially as herein described.

3. The combination, with the air-tube arranged in the track and furnished with air-spouts, and the buckets attached to the car, of a shield flush with ends of the said spouts, and to the surface of which the edges of the  
10 said buckets conform, substantially as herein described.

4. The combination, with the air-tube pro-

vided with outlets furnished with valves, and a jointed flexible bar connected with said valves, of a railway-car furnished with buckets, into which air may be discharged from  
20 said outlets, a series of hangers attached to the car for pressing on the said flexible bar, and a longitudinally-movable rod attached to and arranged lengthwise of the car, for the purpose of depressing said hangers on and pro-  
25 ducing the flexure of the said flexible bar for operating the said valves, all substantially as herein described.

E. G. SMITH.

Witnesses:

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