J. B. CORNELL.

Elevated Railway.

No. 160,650. Patented March 9, 1875.

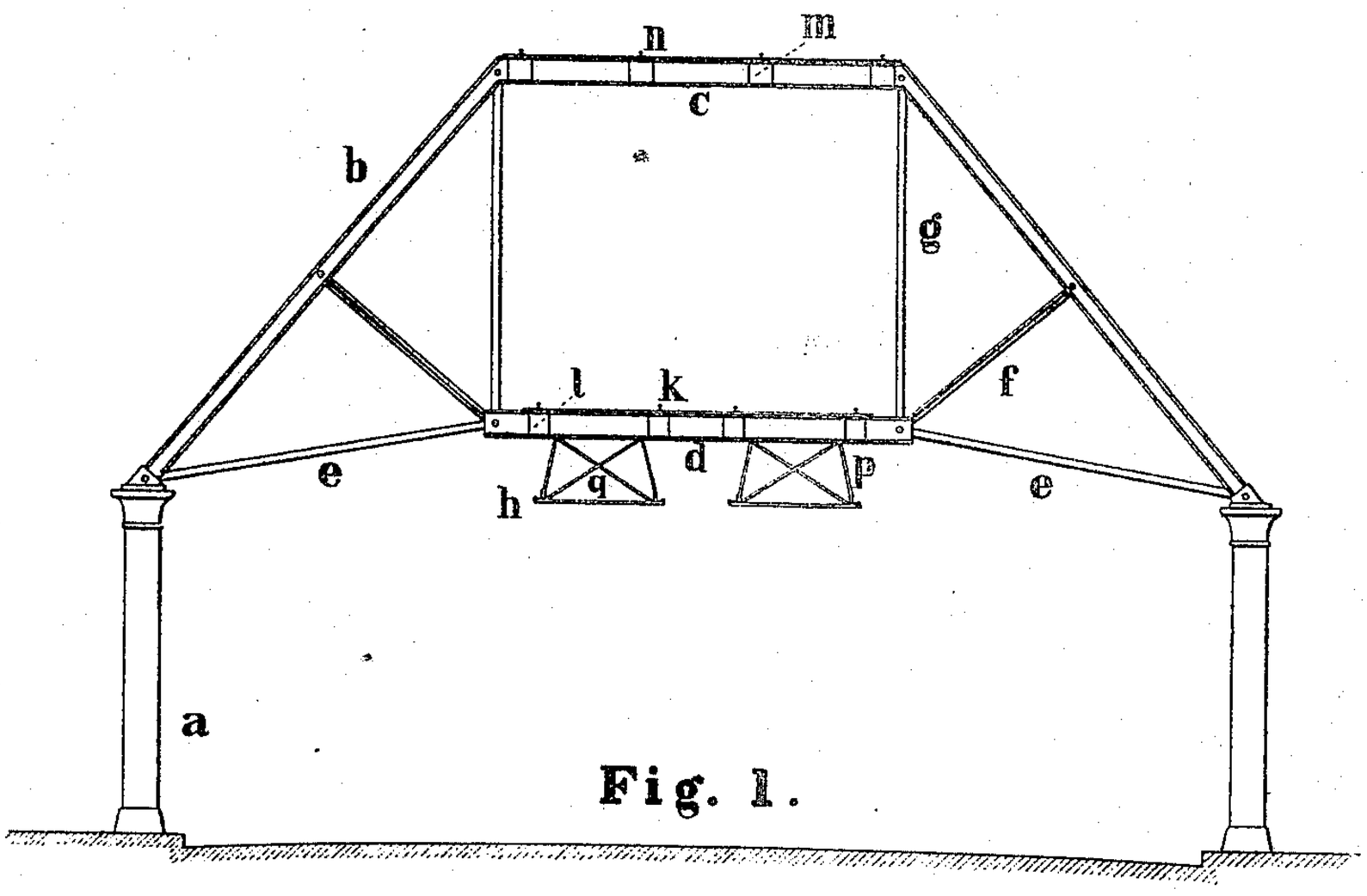

Fig. 1.

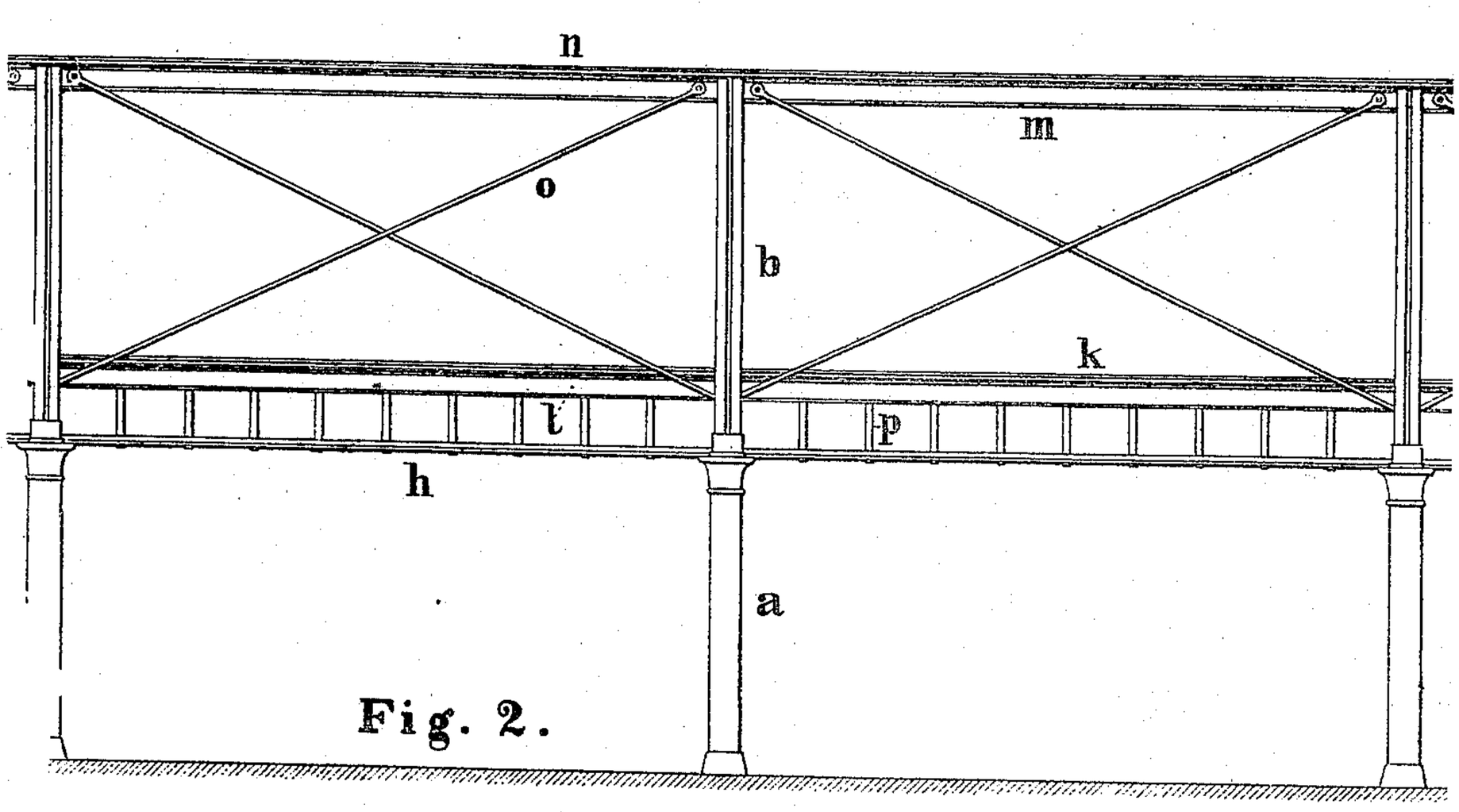

Fig. 2.

Fig. 3.

Witnesses

Thos Crocker

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UNITED STATES PATENT OFFICE.

JOHN B. CORNELL, OF NEW YORK, N. Y.

IMPROVEMENT IN ELEVATED RAILWAYS.

Specification forming part of Letters Patent No. **160,650**, dated March 9, 1875; application filed February 3, 1875.

To all whom it may concern:

Be it known that I, JOHN B. CORNELL, of the city, county, and State of New York, have invented an Elevated Railway, of which the following is a specification:

The object of my invention is to secure convenient and rapid transit for passengers in cities. To accomplish this, a comprehensive system should provide for the varying distances which people have to travel. The present well-known horse street-railway is admitted to be exceedingly convenient for short distances; but for greater distances—say, exceeding one mile—they are generally regarded as unsatisfactory, because of the low rate of speed which obtains with them. As at present constructed, also, they amount to a nuisance to all who have to use the streets with ordinary vehicles.

The railway which I have invented retains the horse-car, or car into which people may step from the street, only it is suspended from the longitudinal supporting-girders of an elevated railway above it, and thus avoids the objectionable feature of encumbering the street-pavement with the rails. It also avoids the danger of injuring persons who may fall beneath the cars. Above this suspension-railway I have two double-track ways for steam-cars—the lower one for short distances, greater than is pleasant for horse-car traveling, and the upper for longer distances, carrying express-trains which may run with great speed, and, connecting with surface-roads at the suburbs, accommodating the out-of-town residents who transact business in the city, and others.

In order that persons skilled in the art to which my invention appertains may make and use it, I proceed to describe it as follows, reference being had to the accompanying drawing, in which—

Figure 1 is a transverse sectional elevation; Fig. 2 is a side elevation, and Fig. 3 is a detail cross-section of the suspended rails *h*.

Like letters refer to like parts in all the figures.

Iron columns *a* are set near the curbs of the side-walks in a street of a city, having their bases firmly fixed upon appropriate foundations. Resting upon the tops of these columns, and extending from one to the other across the street, is an iron truss composed of the inclined struts *b*, horizontal compression member *c*, tie-rod *e d e*, suspension-rods *g*, and braces *f*. These pairs of columns and their connecting-trusses occur at convenient intervals along the street, at distances of, say, thirty to fifty feet, as the constructing engineer may design, and are connected by the supporting-girders *l*, which are carried by the girder *d* of the truss, and *m*, which are carried by the horizontal member *c* of the truss. Upon these supporting-girders the rails *k* and *n* rest. They are braced and kept firm in position by the diagonal braces *o*. From the girders *l* of the lower steam-railway there are suspended the rails *h* by the bars *p*, and braced by the bars *q*. These rails may be of any suitable form of cross-section; but I prefer that shown in Fig. 3, because it is of convenient form for the attachment of braces, and because it brings the height between the fixed height of clearance over the street traffic and that of the surface upon which the wheels roll to a minimum.

The bracings from rail to rail shown in the drawing may be omitted and dependence placed wholly upon the diagonal braces; or they may form a regular truss between the rails, in which case the diagonal braces shown in the drawing may be made lighter, or, indeed, omitted altogether, as may be preferred by the constructing engineer in each case. Again, diagonals may be introduced so as to form longitudinal truss-girders, of which the supporting-girders of the elevated road will constitute the upper compression-chord, and the suspended rails the lower tension-chord. With this arrangement appropriate sections would be given, in accordance with well-known engineering principles, to all the parts, including the two chords, of which the lower would act as the rail for the horse-cars. The arrangement of these suspended rails and their bracings shown in the drawing provides for car-wheels having short independent axles. If it is preferred to employ the more usual arrangement of axles running across, engaging two wheels each, then the bracings would have to be from the rails outward. I consider this inferior to the plan shown in the drawing, on account of the inconvenience of bracing the rails which it involves.

There would be the usual devices, well known to engineers, providing for the expansion and

contraction of the metal with varying temperatures; also, the usual bracings of the various parts.

It will be perceived that a structure of this description, running from end to end of a crowded city, will afford accommodation to passengers superior to anything now in use, without in the least obstructing the ordinary traffic or disturbing the adjacent buildings.

All the cars are in the middle of the street. Passengers who wish to go a short distance can stop a car at any point to get on or off, and do not have to ascend or descend any stairs. Those who wish to go too far to make it desirable to avail themselves of this convenience can obtain more rapid transit by going to the nearest station and ascending one pair of stairs. Those who have to go so far that the several stoppages of such a train are preferably avoided will not feel it a hardship to go up two short flights. Indeed, if the traffic is sufficient to warrant it, elevators can be provided at these stations. Or, the system upon which the railway is conducted may be such that a passenger can buy a ticket in a horse-car at any point to proceed to any distant point, ride thereon to the first steam-car station, and, if this is not a through station, or station of the uppermost road, ride on the lower steam-railway to such through station; thence, upon the upper road, to a through station nearest to his destination, descend one flight, take the lower steam-road to the station on that nearest to his stopping-place; then take a horse-car to the exact point at which he wishes to arrive.

I am aware that Dr. R. H. Gilbert has patented, "in an elevated railway, a transverse-arched girder supported upon columns, and having a clear center for the passage of trains;" but my invention does not depend in the slightest degree upon the arched principle, but upon the fundamentally different principle of the strut-and-tie truss. In the device of Dr. Gilbert dependence is placed upon the resilient power of the arched girder B B, (see Patent No. 152,625, June 30, 1874,) to sustain the strain of the suspension-bars *h h*, while in mine the corresponding suspension-bars *g* are sustained from the fixed points of junction between the inclined struts *b* with the horizontal compression member *c*, the said members *b* and *c* resisting the strains as pillars, and not as girders—with their compressive, not with their resilient, powers—and it is easily demonstrated that I secure a stronger and more substantial structure, with equal effort, in this manner than would be accomplished with the arched girder referred to.

I do not claim, broadly, a transverse structure which will provide a clean passage through it for railway-trains, as this has been shown before by several persons; but

What I claim, and for which I desire to secure Letters Patent, is—

1. In elevated railways, the truss formed of the inclined struts *b*, the horizontal compression member *c*, tie-rod *e d e*, and suspension-rods *g*, the suspension-rods *g* being far enough apart to allow of the passage of railway-trains between them.

2. The rails *h*, suspended from the longitudinal supporting-girders *l* by the suspension-bars *p*.

JOHN B. CORNELL.

Witnesses:
THOS. CROCKER,
ALBAN C. STIMERS.