No. 641,829. Patented Jan. 23, 1900.

# L. J. BRUNS & H. R. OTTESEN.

## ELECTRIC OVERHEAD RAILWAY.

(Application filed Aug. 15, 1899.)

(No Model.) 2 Sheets—Sheet 1.

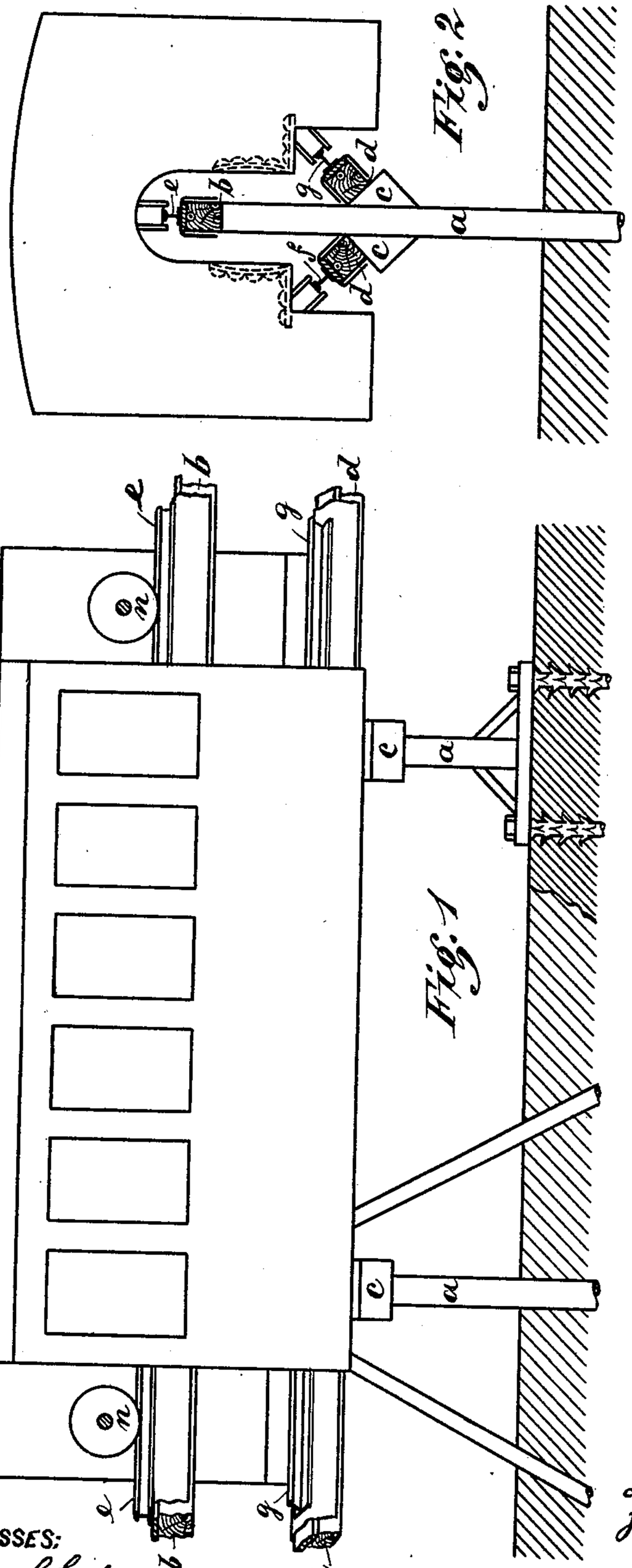


Fig. 1.

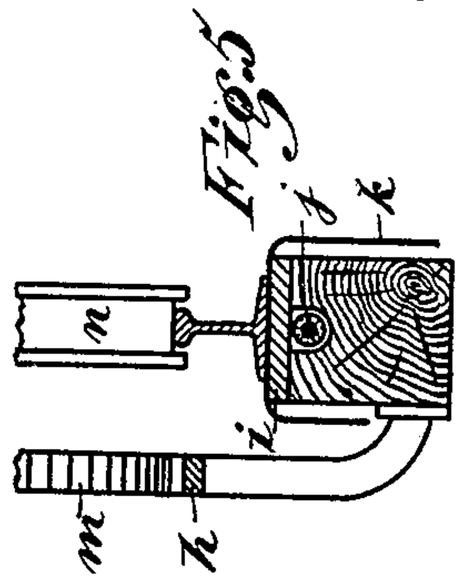


Fig. 2.

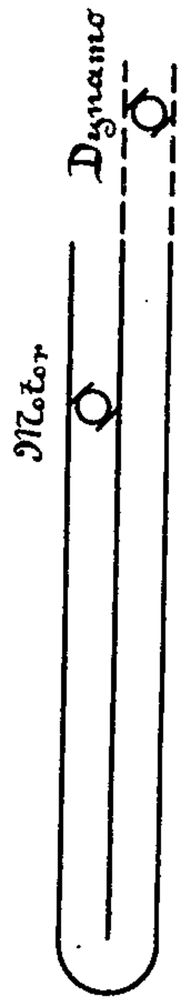


Fig. 3.

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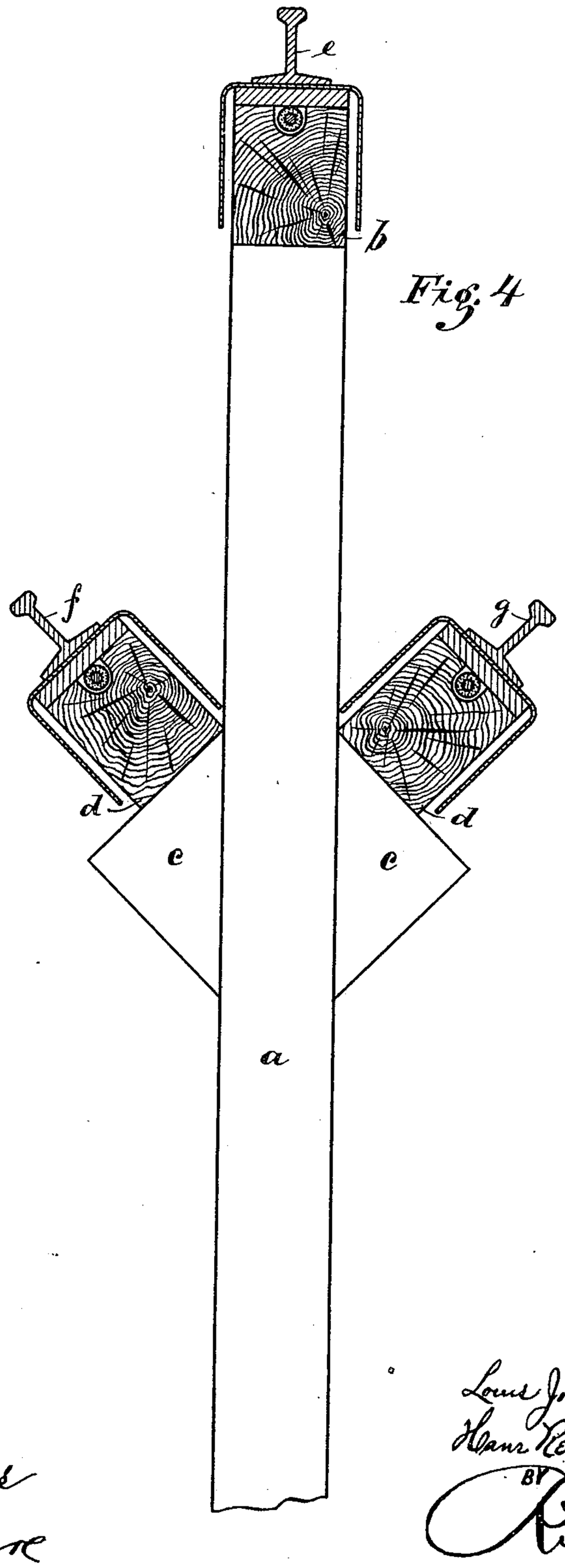


Fig. 4

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# UNITED STATES PATENT OFFICE.

LOUIS JOHANN BRUNS AND HANS REALF OTTESEN, OF HANOVER, GERMANY.

## ELECTRIC OVERHEAD RAILWAY.

SPECIFICATION forming part of Letters Patent No. 641,829, dated January 23, 1900.

Application filed August 15, 1899. Serial No. 727,270. (No model.)

*To all whom it may concern:*

Be it known that we, LOUIS JOHANN BRUNS and HANS REALF OTTESEN, engineers, residing at the city of Hanover, in the German Empire, have invented certain new and useful Improvements in Electric Overhead Railways, of which the following is a full, clear, and exact description.

The present invention relates to an electric overhead railway with three rails, the carriages of which in cross-section have somewhat the shape of an inverted U, so that they can some way ride on the center rail, which is placed above the two other rails. The two arms of the U have on their lower inner ends wheels adapted to engage with the lower rails, and the rails can be used at the same time for conducting the current and for bearing or guiding the carriages.

Our improved elevated railway is illustrated in side elevation in Figure 1 of the accompanying drawings, parts of the front and back portions of the car being removed for the better comprehension of the invention. Fig. 2 is a front elevation. Fig. 3 is a diagram of the circuit. Fig. 4 shows a part of Fig. 2, on an enlarged scale, and illustrates the engagement of the cables in the posts and the arrangement of the insulating covering-plates and the current-conducting protecting caps or hoods. Fig. 5 illustrates the arrangement of a rack alongside the middle rail for the engagement of a toothed wheel on steep grades.

The line or permanent way of the new elevated railway consists of standards *a*, erected or bolted at certain distances from each other, which are connected above by a beam *b* and at the sides by means of the two beams *d*, conveniently supported on two small piers or projections *c*. The rails *e*, *f*, and *g* are separately secured to their respective beams, as will be described farther on.

The cars have a set of wheels on their front and on their back ends, the suspension-springs of which (not illustrated in the drawings) are so connected with each other that the pressure is equally distributed. In general only the wheel *n*, running on the rail *e*, is driven.

If the railway is to be driven with polyphase currents, then all three rails and the wheels running upon them may be used for current-conduction. If, on the contrary, continuous current is employed, the wheels running on the one rail are completely insulated from the cars. Then by arranging the circuit as illustrated in Fig. 3 the electromotive force supplied to the motors will be maintained substantially constant irrespective of the distance from the central or feeding station.

In order to protect the beams from exposure to the weather and to be able to properly lay the cable which from time to time conducts the current to the rails, the arrangement illustrated on a larger scale in Fig. 4 is employed. On the upper side of the beam a channel is made in which is inserted the insulated cable *j*. The channel is covered with insulated plates *i*, and over these and also over the beam itself is placed a protecting-cap *k* of bell-shaped section. The two vertical portions of the cap do not lie close to the beam. The cables *j* are supplied directly from the central or transformer, and if it is a case of working with continuous current they are conductingly connected at certain distances with the rails. If, however, polyphase current or alternating current is employed, then transformers arranged at suitable distances are supplied through the cables *j*. In the secondary circuit of the transformers is then always inserted a certain portion of the line separated from the neighboring rails. The hood *k* serves of course directly for protection against the influence of the weather. Rain, for instance, will drop off on the sides of the protecting-hood without touching the wood. Snow or ice cannot either attack the post. Finally, the hood increases the metallic transverse section for the conveyance of the current.

The cars of the new elevated railway run very quietly, as the center of gravity is lower than the point of support on the middle rail, the running-surface of the middle rail being higher than the seats. The danger of running off the rails is therefore completely obviated.

On especially steep ascents and descents and the like a rack *h*, Fig. 5, can be arranged near the uppermost rail in which a cog-wheel

*m* engages, so that adhesion is seconded, this arrangement being also advantageously employed for the braking of the car or train. Cramp devices can, however, be also provided as brakes, which hold one or more rails sidewise.

As the new line requires no kind of railway structure, it is especially adapted for road, mountain, or colonial railways. The whole arrangement takes up little space and is entirely independent of smaller obstacles in the ground. Furthermore, snow and rain cause no interruption in the working or costs of repairs.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

In electric overhead railways, the combination of the posts, cables *j* located in grooves therein, insulating-plates *i* covering the grooves, the protecting hoods or caps *k* arranged on the plates and the rails resting on the caps and in conducting contact with the same, essentially as described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

LOUIS JOHANN BRUNS.
HANS REALF OTTESEN.

Witnesses:
LEONORE KASCH,
L. MÖLLER.