

No. 674,109.

Patented May 14, 1901.

B. W. TUCKER.  
ELECTRIC RAILWAY SYSTEM,

(Application filed Feb. 9, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

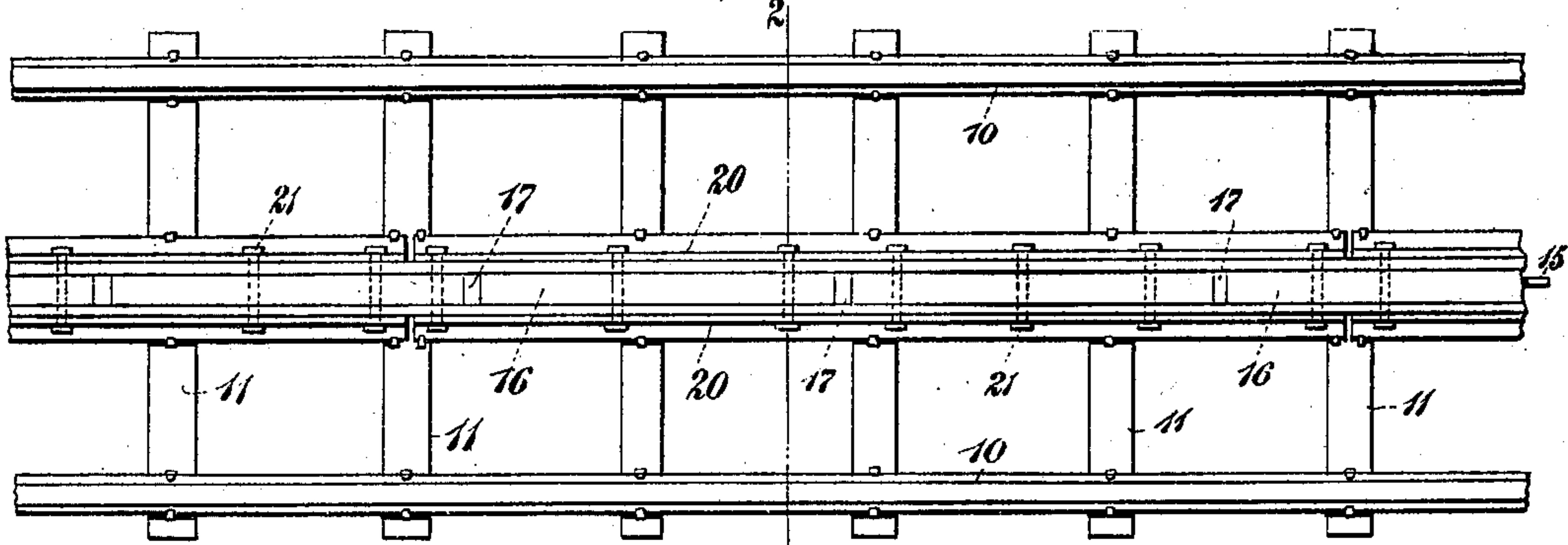


Fig. 2.

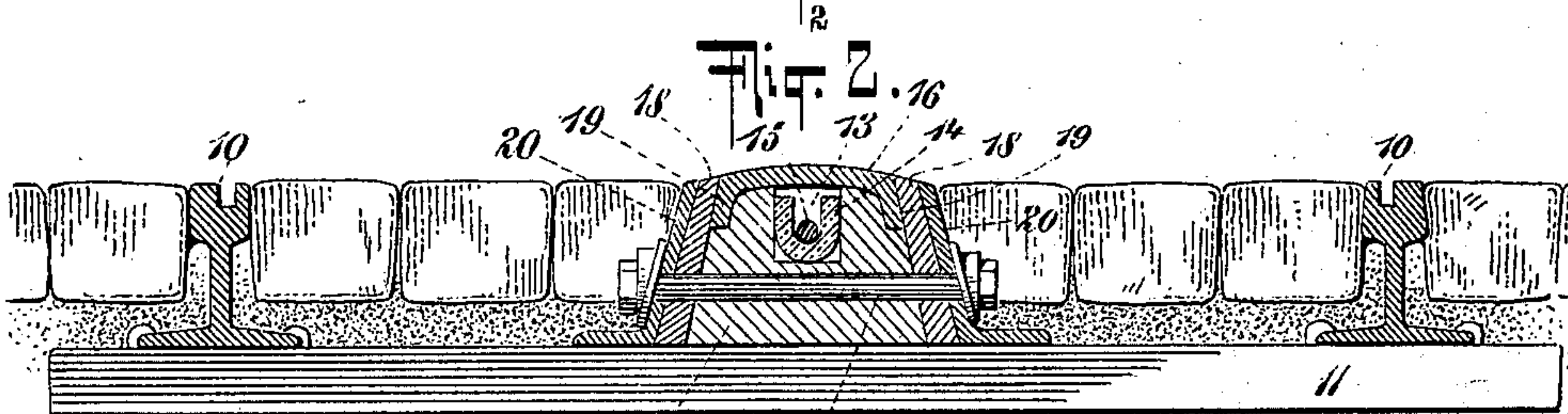


Fig. 3.

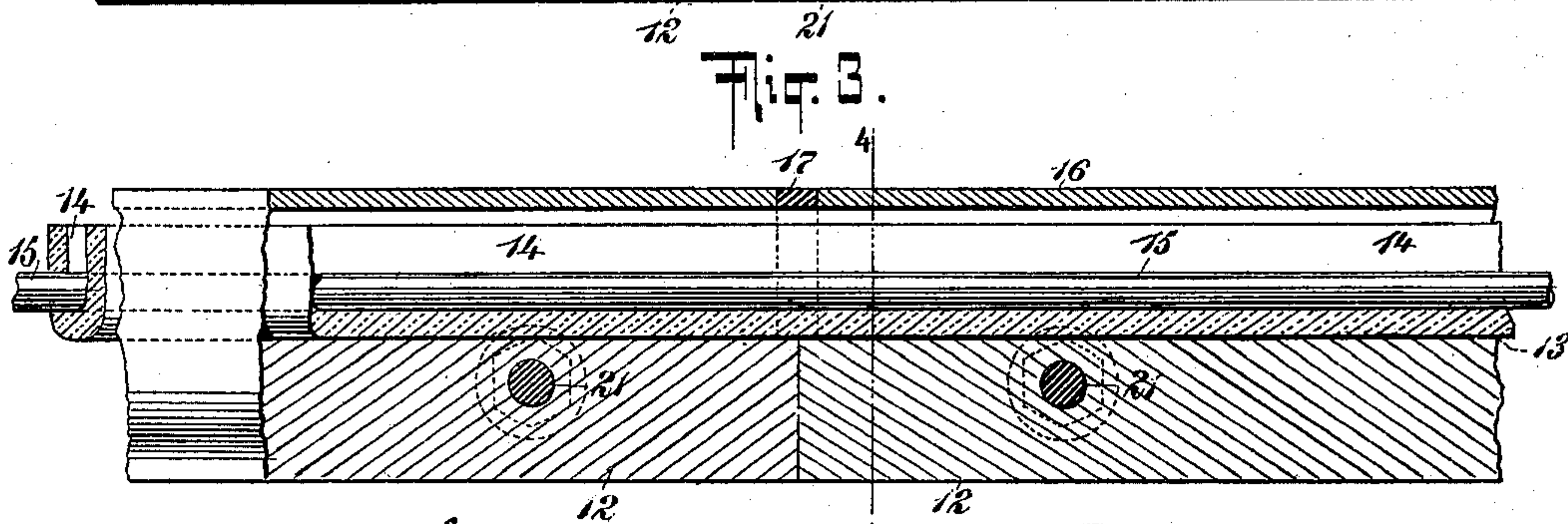


Fig. 4.

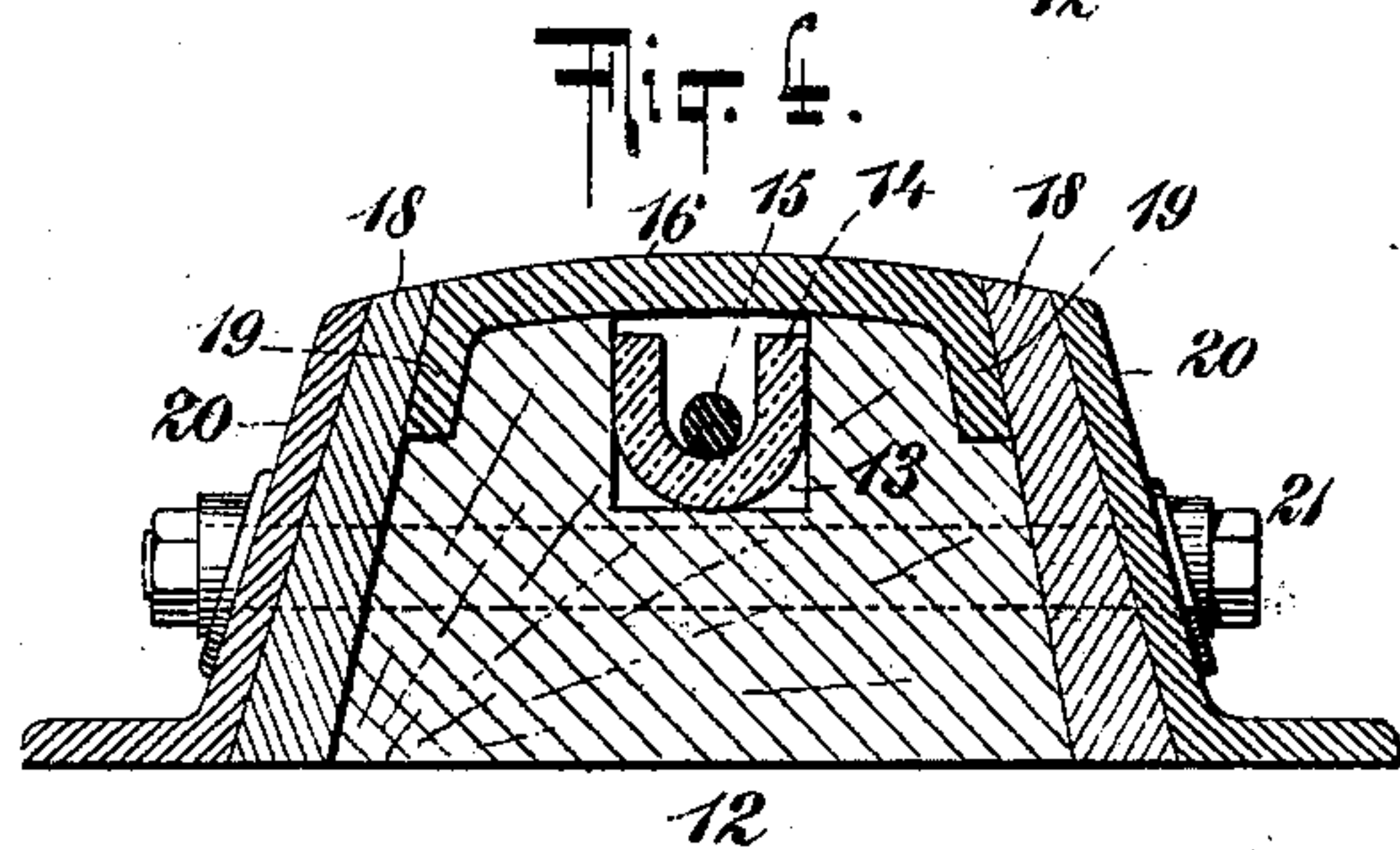
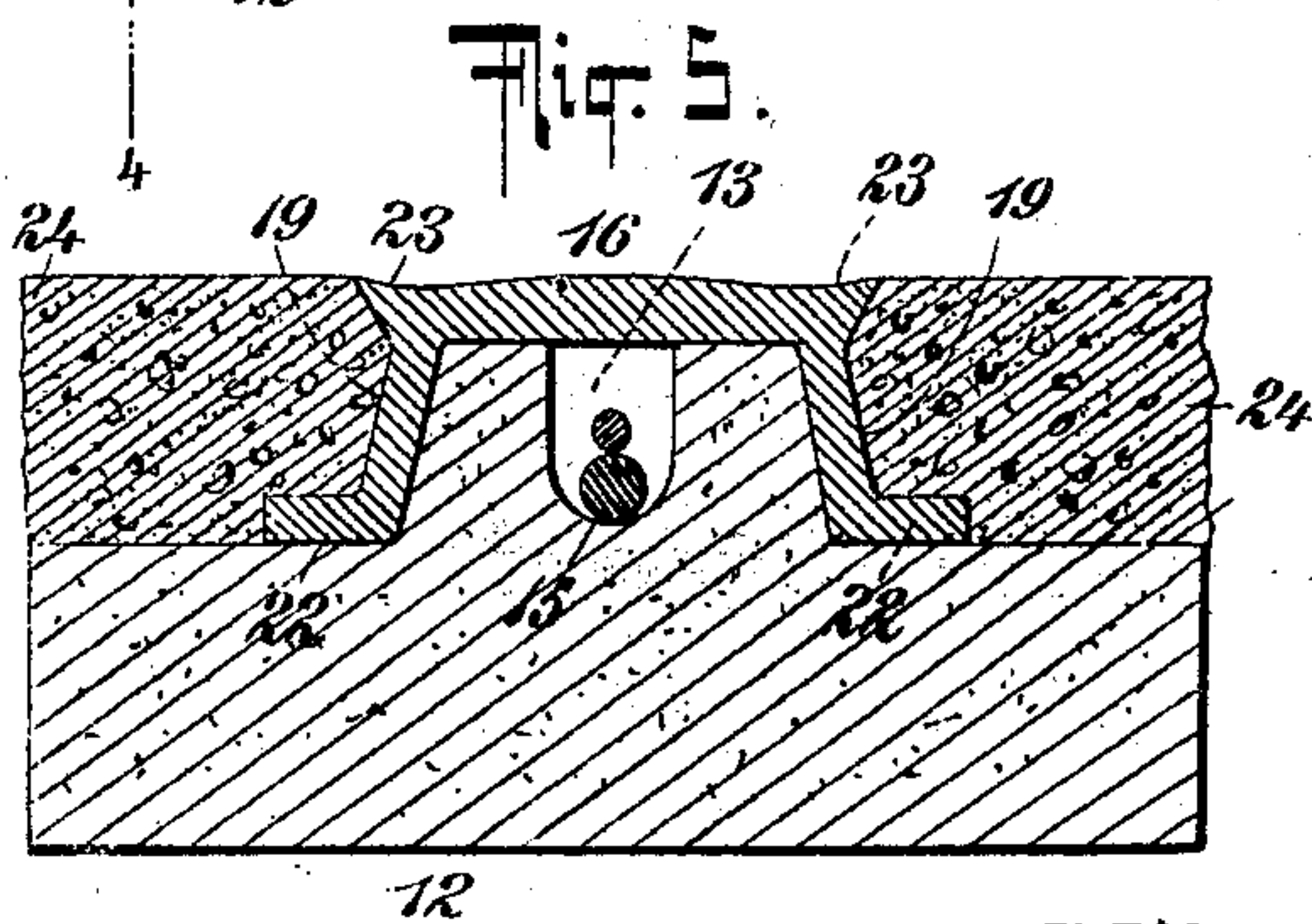


Fig. 5.



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Fig. 6.

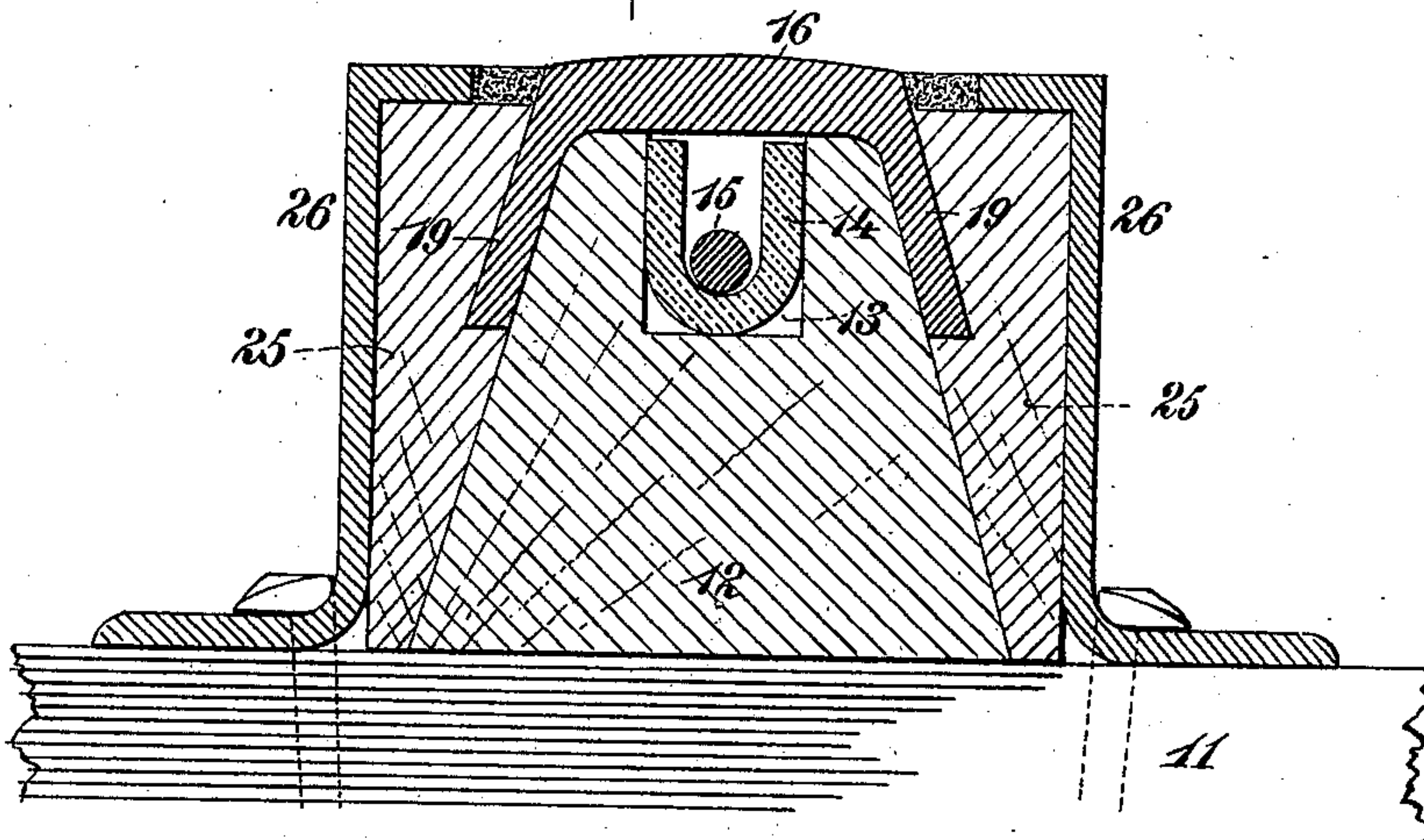
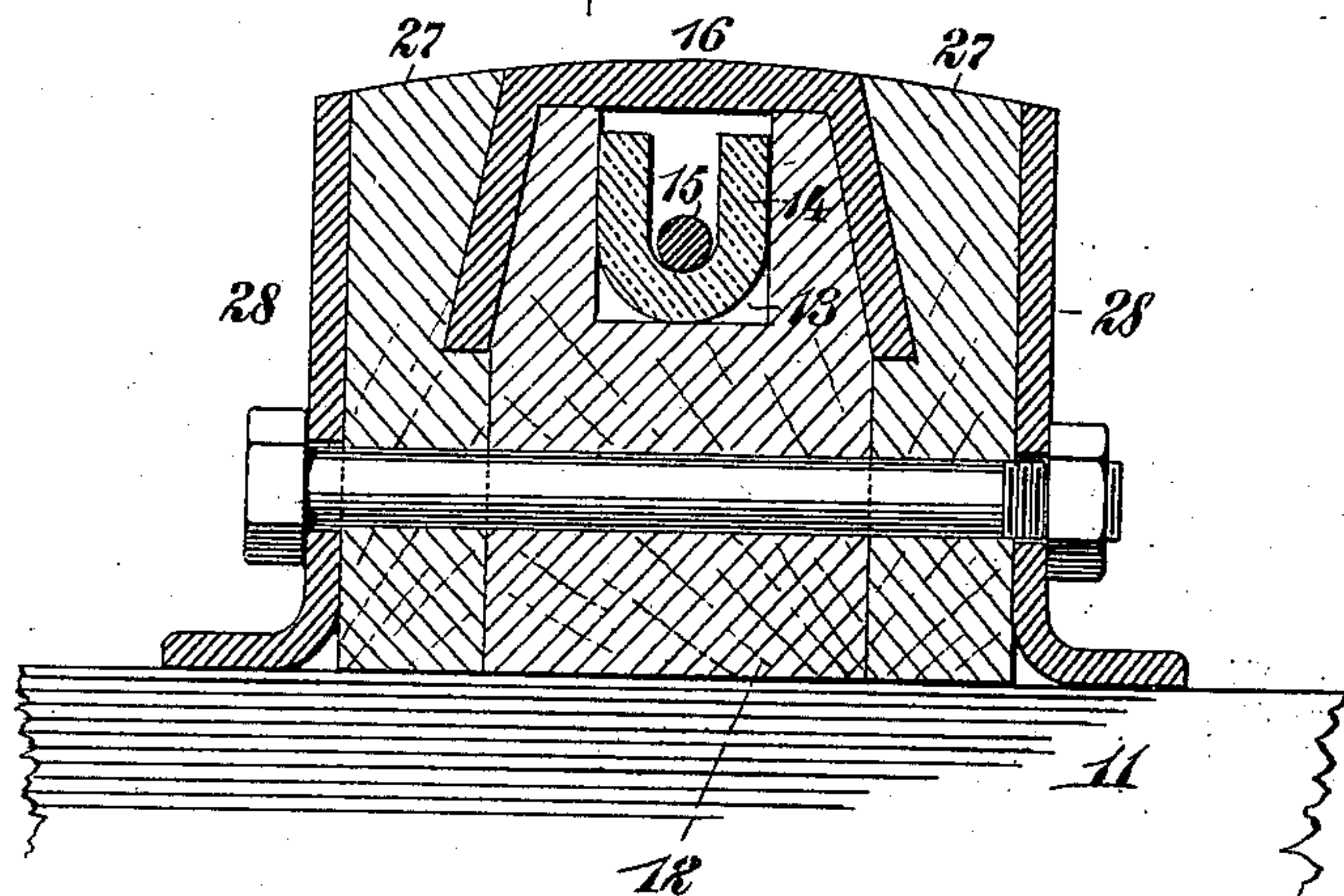


Fig. 7.



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# UNITED STATES PATENT OFFICE.

BENJAMIN W. TUCKER, OF NEWARK, NEW JERSEY.

## ELECTRIC-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 674,109, dated May 14, 1901.

Application filed February 9, 1901. Serial No. 46,608. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN W. TUCKER, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electric-Railway Systems, of which the following is a specification.

This invention relates to certain improvements in safety electric-railway systems, and more particularly to an improved electric rail.

The object of the invention is to provide an electric rail all exposed parts of which are maintained normally electrically dead, whereby the rail can be employed with perfect safety in country and city traction systems and which rail shall be strong, rigid, and durable and yet economical in construction and able to withstand without injury heavy street-traffic and wherein the rail is protected against and thoroughly insulated from its contained live line-wire.

With this and other objects in view the invention consists in certain novel features in construction and in combinations and in arrangements of parts, as more fully and particularly pointed out and described hereinafter.

Referring to the accompanying drawings, Figure 1 is a plan view of a railway-track provided with my improved electric rail. Fig. 2 is a cross-sectional view through a track provided with my improved electric rail, the track being shown embedded in paving. Fig. 3 is a detail longitudinal sectional view of the electric rail. Fig. 4 is an enlarged cross-sectional view of the electric rail on the dotted line 4 4 of Fig. 3. Fig. 5 is a like view showing a modified rail structure embodying some of the features of the invention, and Figs. 6 and 7 are like views of further modified rail structures embodying my invention.

In the drawings, 10 10 designate the track-rails, and 11 the supports therefor, such as cross-ties.

The electric rail consists of a body or bodies of non-conducting and non-magnetizable material, although by such description I do not mean and do not limit myself to an electric rail wherein metal is not employed for the better protection and bracing of the rail and parts thereof.

12 denotes the body or central portion of the electric rail and is composed of suitable insulating and non-magnetizable material, such as wood or composition, and preferably formed of sections or stringers placed end to end to form the continuous rail. This body 12 will have a flat base usually, which rests on the cross-ties or other track-supports. The top of the body 12 is formed with a longitudinal central groove 13, which in a full-sized rail will be, say, about one and a half inches wide and about two inches in depth, although of course said dimensions can be greatly varied. In this groove 13 is placed a trough 14, composed of any suitable refractory insulating material, preferably of ceramic character, such as any cheap grade of porcelain or the like. This trough is preferably U-shaped in cross-section, with an open top, and may be cast or molded in sections which can be loosely fitted or dropped into the groove 13 of the wooden body 12. The groove 13 in the wooden body 12 has a flat bottom, while the trough may be formed with a rounded bottom, so that the trough rests in the groove about as shown, and thereby danger of breakage of the trough is lessened, and the trough can be easily and economically manufactured. The upper edges of the trough are, preferably, below the plane of the top face of the body 12, so that the exposed conductor-sections hereinafter described rest on the top of the body 12 without engaging the trough, thereby avoiding danger of crushing the trough or shattering the same by the vibrations of said conductor-sections during the passage of wagons over the same.

The porcelain trough 14 can be very economically manufactured and can be easily and quickly placed in the groove 13 as the electric rail is being laid. The trough 14 preferably rests loosely in the groove to avoid pressure thereof, although, if desirable, the trough can be fitted snugly in the groove.

After the trough 14 has been placed in the wooden body 12 the line-wire 15 is dropped loosely in the trough and rests in the bottom thereof. This line-wire 15 is electrically connected with the power-generator of the system and is composed of good conducting and magnetizable material, such as stiff iron wire.

The groove or conduit in the rail is sealed



and closed by an exposed normally dead conductor 16, formed in short sections separated by blocks of insulating material 17 of any suitable character. The said conductor 16 is preferably composed of metal bars or plates having rounded upper surfaces and depending side edge flanges. In other words, the said bars are approximately of inverted-U shape in cross-section and are fitted to and rest on the top of the body 12 of the rail, while their edge flanges fit and project down along the sides of the said body, as shown.

Suitable means are provided to clamp or otherwise lock the exposed normally dead conductor 16 in position on the electric-rail body 12, and for this purpose I may employ the side strips or pieces 18, arranged longitudinally along the opposite sides of the body 12 and at their lower edges resting on the cross-ties 11 and with their upper edges preferably, although not necessarily, rounded off and approximately flush with the top face of the conductor 16. The inner faces of these side strips 18 are preferably recessed or rabbeted to receive the downwardly-inclined flanges 19 of the conductor-sections 16. The side strips 18 thus fit the side faces of the rail-body 12 and overlap and fit the flanges 19 of the conductor 16 and lock and hold the conductor 16 in position on the rail and at the same time insulate and inclose the said flanges 19 thereof. These side strips 18 are composed, preferably, of insulating non-magnetizable material, such as wood.

Suitable mechanism can be employed to lock the wooden sections of the rail together and render the structure exceedingly rigid and durable, and for this purpose I can, if desirable, employ the protecting and bracing angle-bars 20, arranged longitudinally along the outer opposite faces of the electric rail and extending from the upper or top face thereof downwardly, with bottom outturned flanges or feet resting on the cross-ties. The longitudinal sections of the electric rail can be firmly and rigidly locked together by cross-bolts 21, passed through the angle-bars and wooden sections transversely in a plane below the groove 13, with heads and nuts at the outer faces of the angle-bars 20.

The entire electric rail can be secured in place to track-supports or to other foundations by spikes or other fastening means.

Those skilled in the art will understand that material advantages are attained by employing the trough 14, of ceramic material, in the wooden or other electric rail, as the line-wire loosely arranged therein is thoroughly insulated and protected, and at the same time the wooden rail is protected against fire or charring because of any possible arcing caused by the high-tension current with which the line-wire is charged.

My improved electric rail is particularly adapted for employment in systems wherein the motor-car carries a magnet which raises the line-wire into contact with the sections

of the exposed conductor successively as the car passes along. The car also carries a contact preferably arranged in the magnetic field and traveling on the exposed sectional conductor 16 to take off the power-current which is passed to the car-motor, the return being provided for in any suitable manner.

The efficiency and durability of the rail structure, together with the ease and rapidity with which it may be laid, are matters of great importance, and it may be mentioned that the conductor-sections 16 and angle-plates 20 are of rolled beam character and readily produced.

I do not wish to limit myself to the employment of the cross-bolts 21 or the sectional construction of the electric rail, nor to the particular shape of the exposed sectional conductor 16, as the shape of said conductor may be varied to suit the requirements of the system, and in Figs. 5, 6, and 7 I illustrate several modified forms of my new rail structure. In Fig. 5 the rail-body 12 is shown as formed with the groove 13, and the side flanges 19 of the conductor 16 are provided at their lower edges with horizontal flanges or feet 22 to rest on the laterally-extending portions of the body 12. In Fig. 5 the upper longitudinal edges of the conductor 16 is formed with the flanges 23, and said conductor is shown as held down upon the body 12 by the concrete or other suitable filling substance 24. The trough 14 is omitted from Fig. 5, since when the body 12 is made of some certain materials the trough 14 may not be necessary.

The rail structure shown in Fig. 6 presents the rail-body 12 and conductor 16, having downwardly-converging sides, which is a feature of advantage; but the side locking and insulating strips 25, while conforming at their inner faces to the sides of said body and conductor, have vertical outer faces and are held in position by angle-bars 26, differing somewhat in form from the angle-bars shown in Fig. 4.

In the form of rail structure shown in Fig. 7 the lower portion of the body 12 and the outlines of the side strips 27 and angle-bars 28 differ somewhat from the corresponding parts of the rail structures shown in Figs. 4 and 6, as will be understood without detailed explanation.

It is evident that changes might be made in the forms, constructions, and arrangements of the parts described without departing from the spirit and scope of my invention. Hence I do not wish to limit myself to the exact constructions shown.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The electric rail having the open-top trough of ceramic material inclosed therein, and the line-wire in and the exposed conductor over the trough, substantially as described.

2. The electric rail having the grooved body, the ceramic trough inclosed therein, and a



live conductor in and a normally dead conductor over said trough, substantially as described.

3. The electric rail having a groove in its body, combined with a U-shaped trough of refractory material in said groove, a live conductor loosely resting in said trough, and a sectional exposed conductor over said trough and closing the same and the groove, substantially as described.

4. The electric rail having a top longitudinal groove in its body, combined with a ceramic trough in said groove with its top edges below the plane of the top face of said body, a conductor in said trough, and a sealing or capping exposed conductor resting on the top of said body, substantially as described.

5. The electric rail having the longitudinal groove combined with the trough of refractory material placed loosely therein, the live line-wire movably resting in said trough, and the exposed conductor over said trough, substantially as described.

6. In an electric rail the body having the groove, the wire therein, the exposed sectional conductor over the wire, and longitudinal side means engaging and locking said conductor; substantially as set forth.

7. The electric rail comprising a longitudinal body portion having a longitudinal open-top conduit, a line conductor therein, the exposed sectional conductor fitting the top of said body and sealing the said conduit, side pieces locking said conductor down on the rail, and securing means for said side pieces, substantially as described.

8. An electric rail comprising a longitudinal body of non-conducting and non-magnetizable material and having the open-top groove, and the line conductor in said groove, combined with the sectional exposed conductor on said body and depending at the sides thereof, and longitudinal side-securing means

engaging said body and said depending portions of the conductor, substantially as described.

9. In an electric rail the body containing the groove, and the line conductor in said groove, combined with the exposed sectional conductor, the longitudinal sections clamping said sectional conductor in place, the side angle-bars engaging said sections, and means for locking the parts together, substantially as described.

10. In an electric rail, the body of insulating and non-magnetizable material and having the downwardly-diverging side portions, said body having the open-top longitudinal groove in its upper portion, and the movable conductor in said groove, combined with the conductor-sections on said body and closing said groove and having the downwardly-diverging side flanges to engage the said side portions of said body, and means for securing said conductor-sections; substantially as set forth.

11. In an electric rail, the body of insulating and non-magnetizable material and having the downwardly-diverging side portions, said body having the open-top longitudinal groove in its upper portion, and the movable conductor in said groove, combined with the conductor-sections on said body and closing said groove and having the downwardly-diverging side flanges to engage the said side portions of said body, and means for securing said conductor-sections, said body also affording seats for the lower edges of said side flanges, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 8th day of February, A. D. 1901.

BENJAMIN W. TUCKER.

Witnesses:

CHAS. C. GILL,  
GUNDER GUNDERSON.