(No Model.)

11 Sheets—Sheet 1.

A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.

Fig. 1

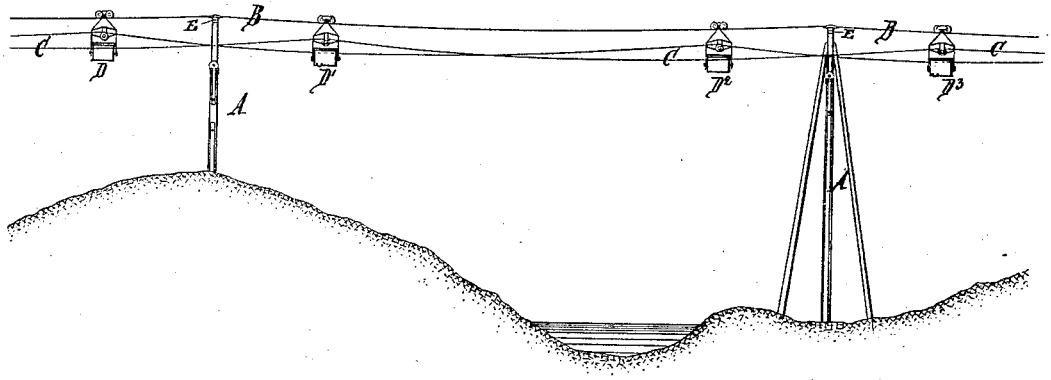
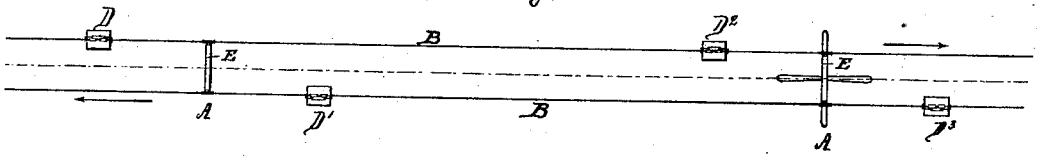


Fig. 2.



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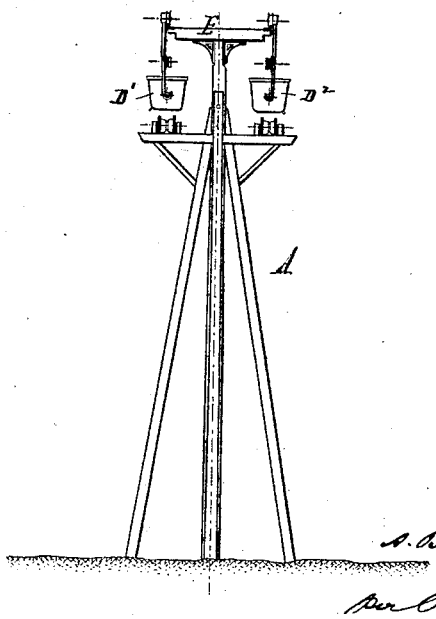

Witnesses.
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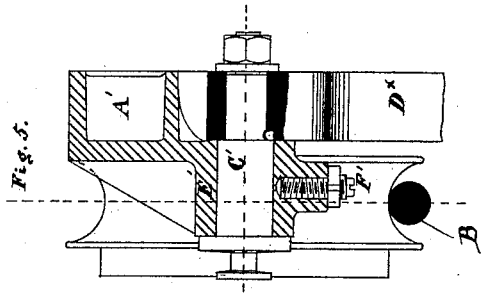
(No Model.) 11 Sheets—Sheet 2.

A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.

Fig. 5.



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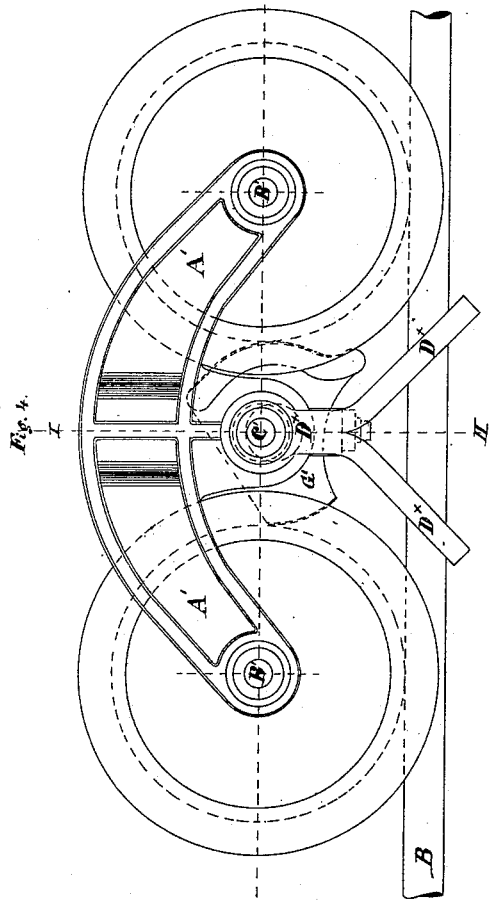

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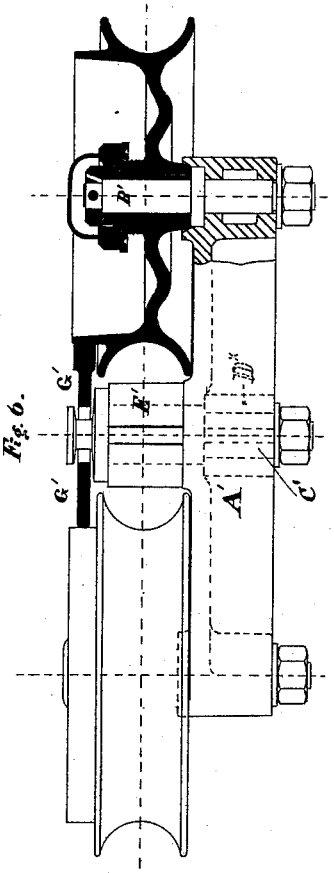

Witnesses.
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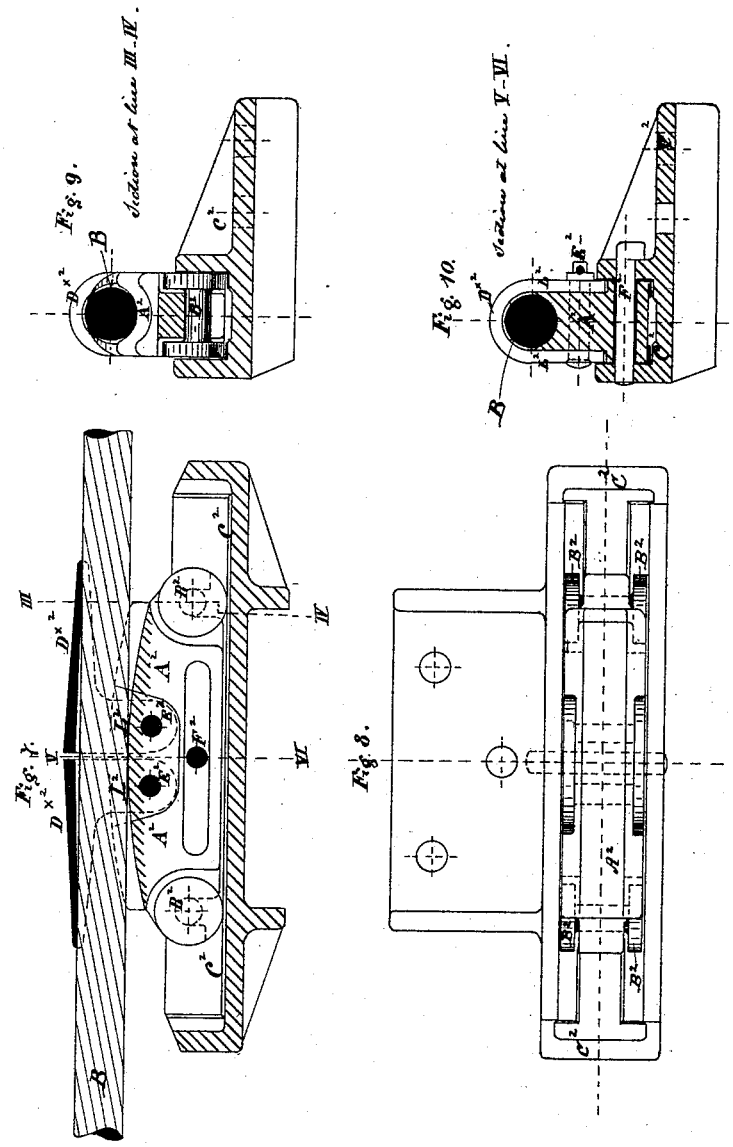
(No Model.) 11 Sheets—Sheet 3.

A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.



Witnesses.
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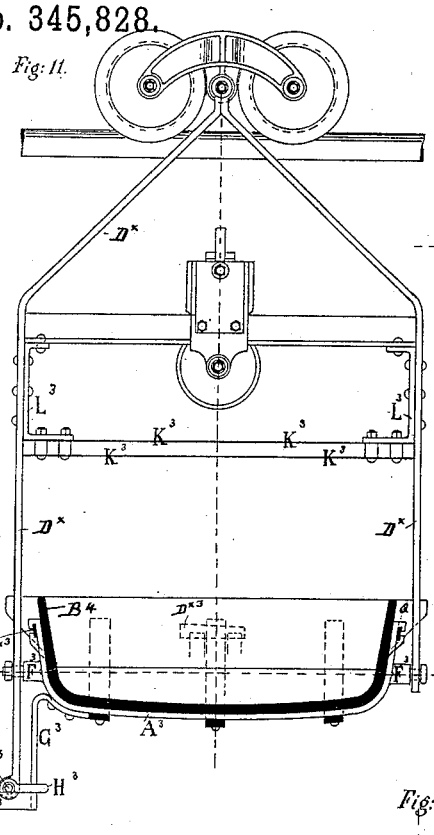
A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.

Fig: 11.



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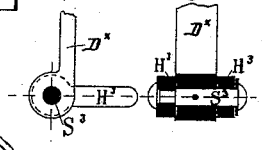
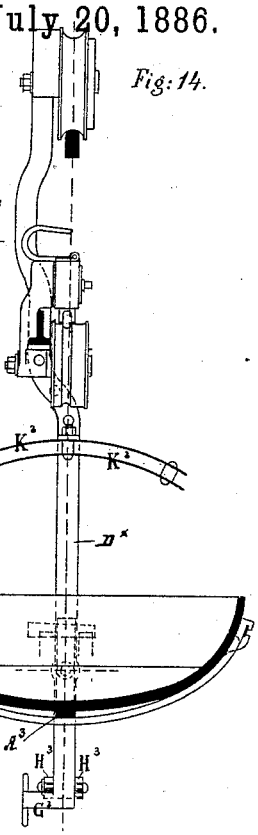


Fig: 18.

Fig: 14.



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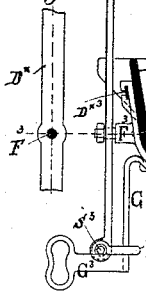

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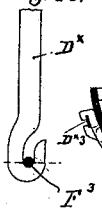

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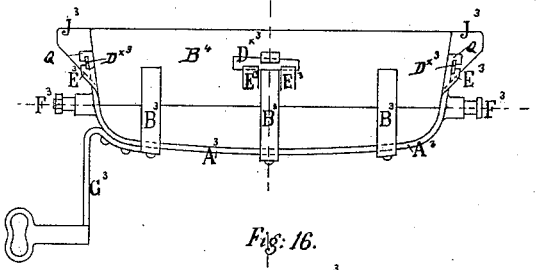

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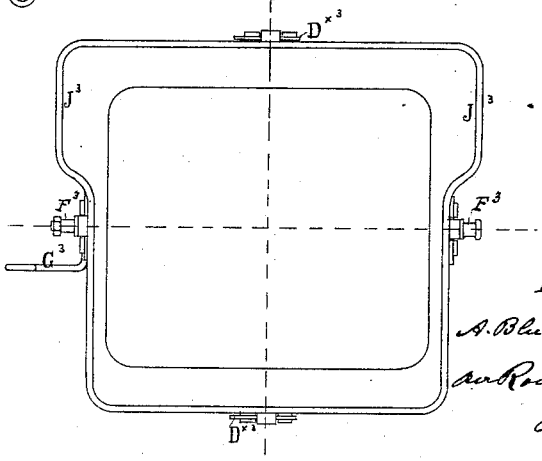

Witnesses.
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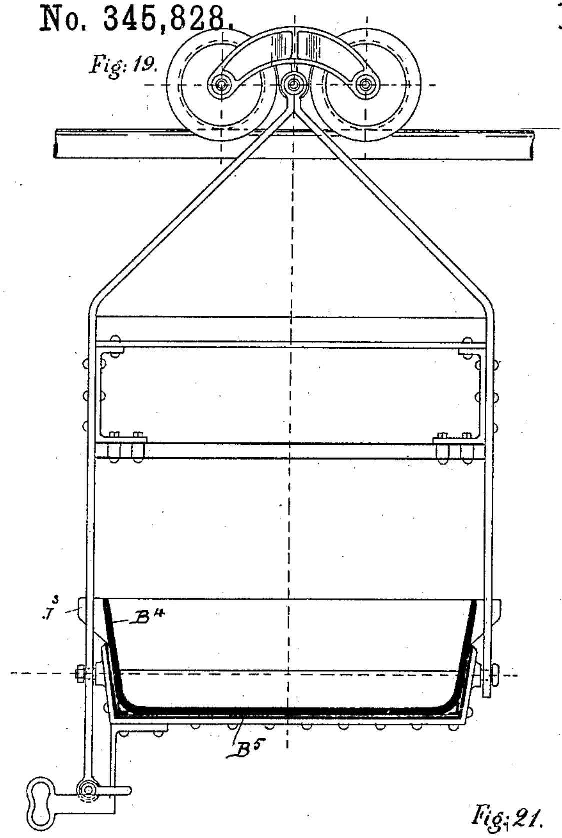
(No Model.) 11 Sheets—Sheet 5.

A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.

Fig: 19.



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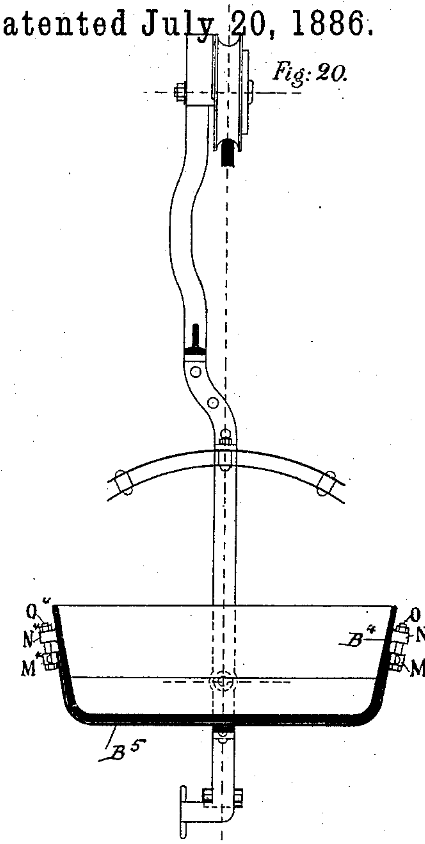

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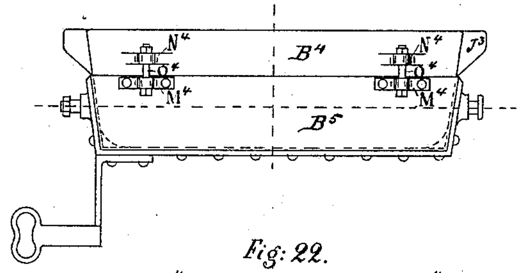

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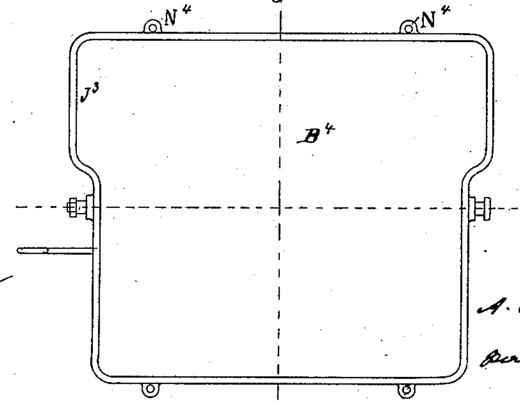

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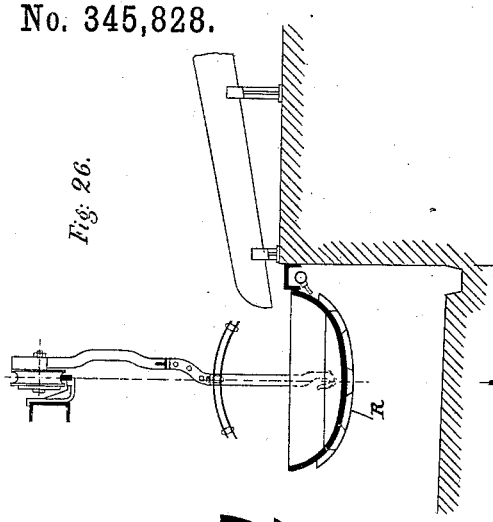
(No Model.) 11 Sheets—Sheet 6.

A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.

Fig. 26.



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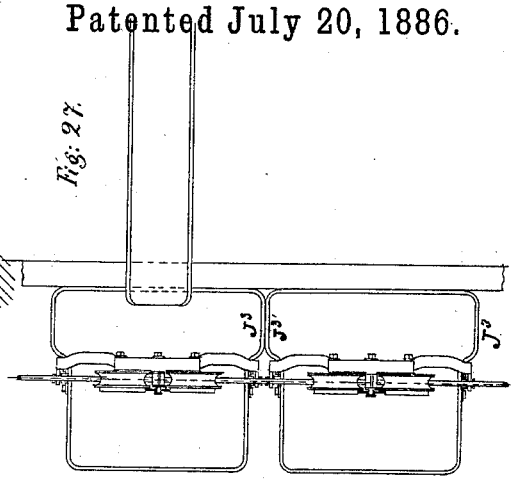

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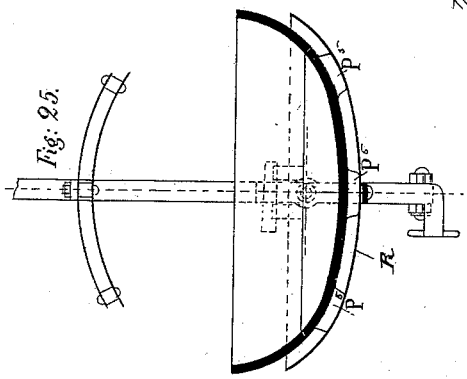

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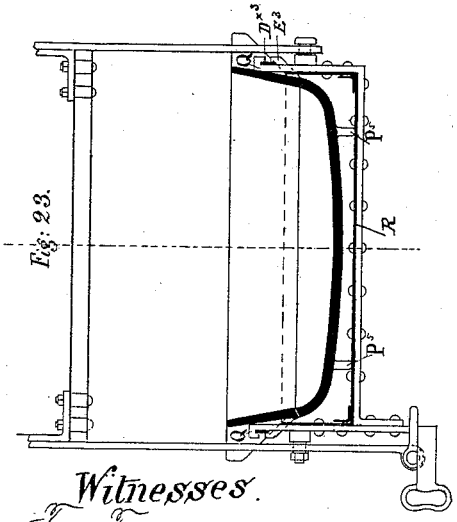

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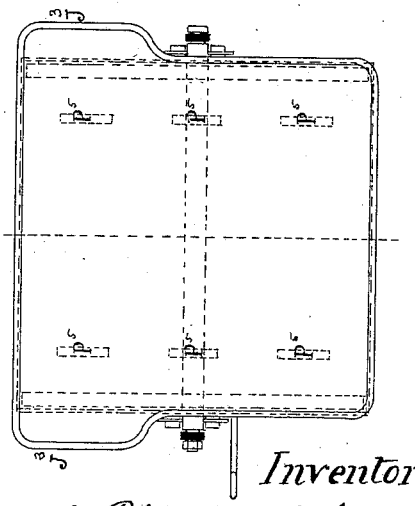

Witnesses.
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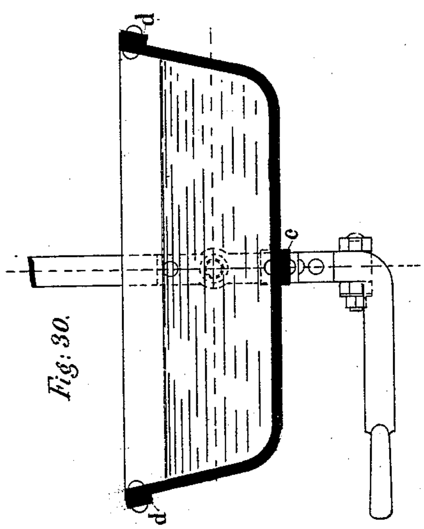
(No Model.)

A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.



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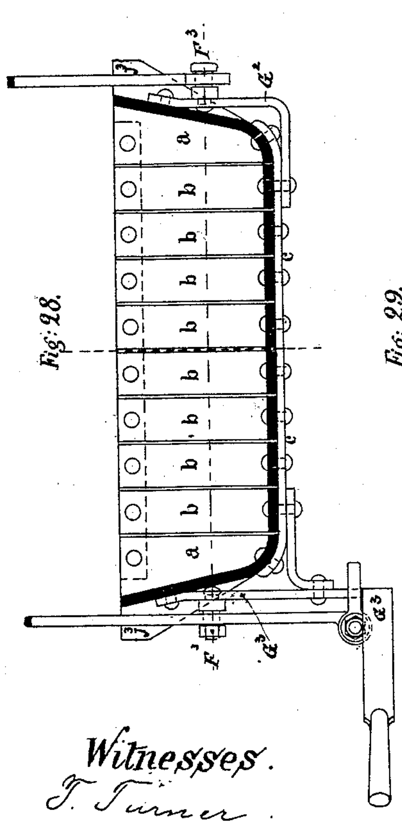

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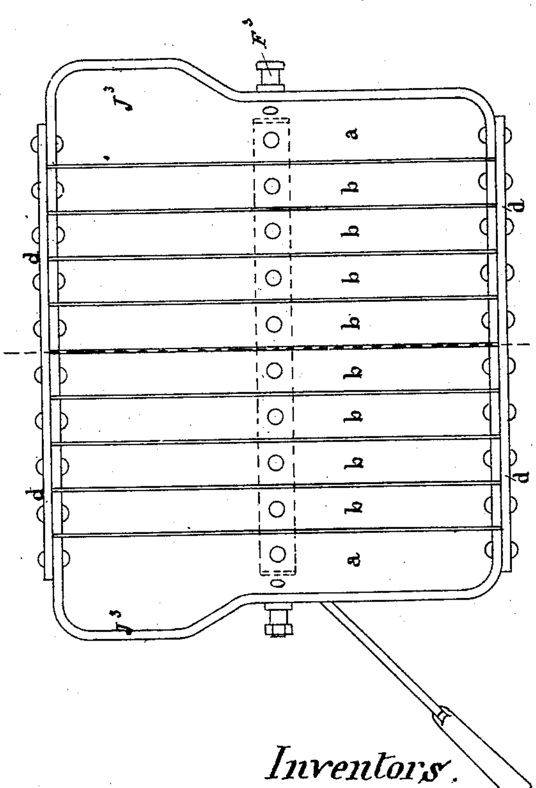

Fig: 29.

Witnesses.
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(No Model.) 11 Sheets—Sheet 8.

A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.

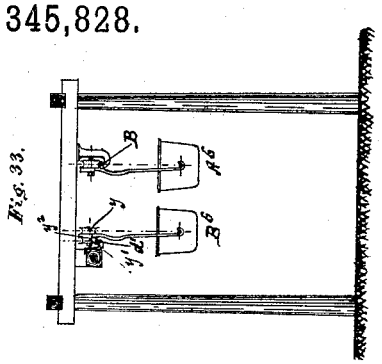

Fig. 33.

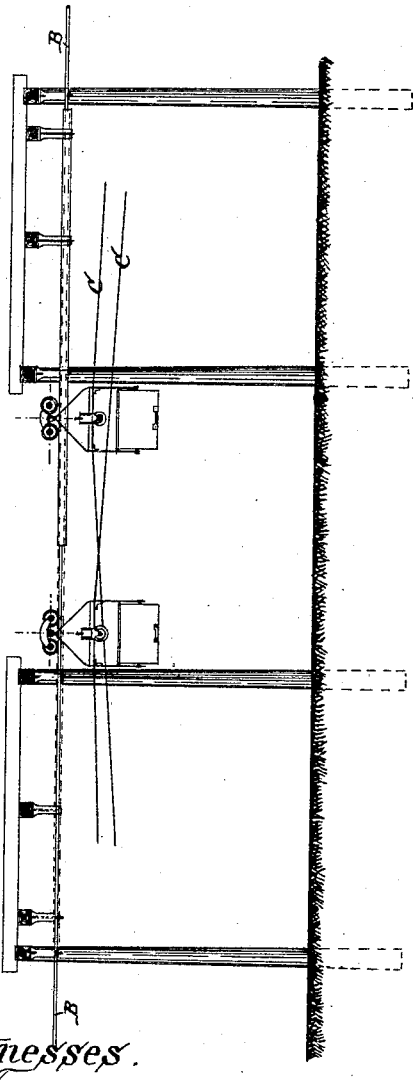

Fig. 31.

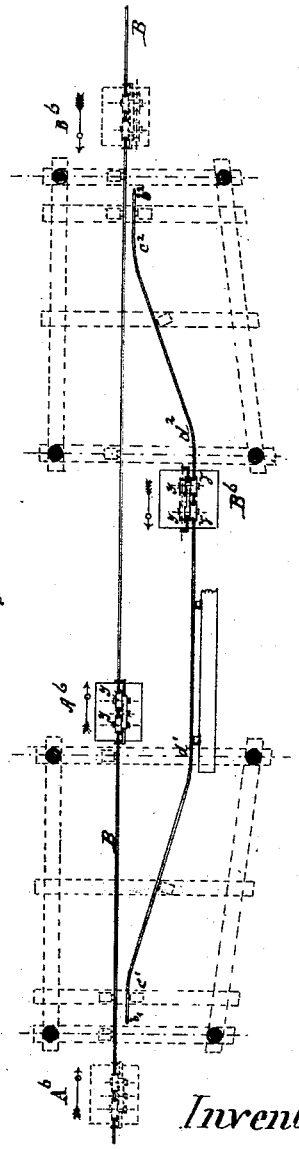

Fig. 32.

Witnesses.
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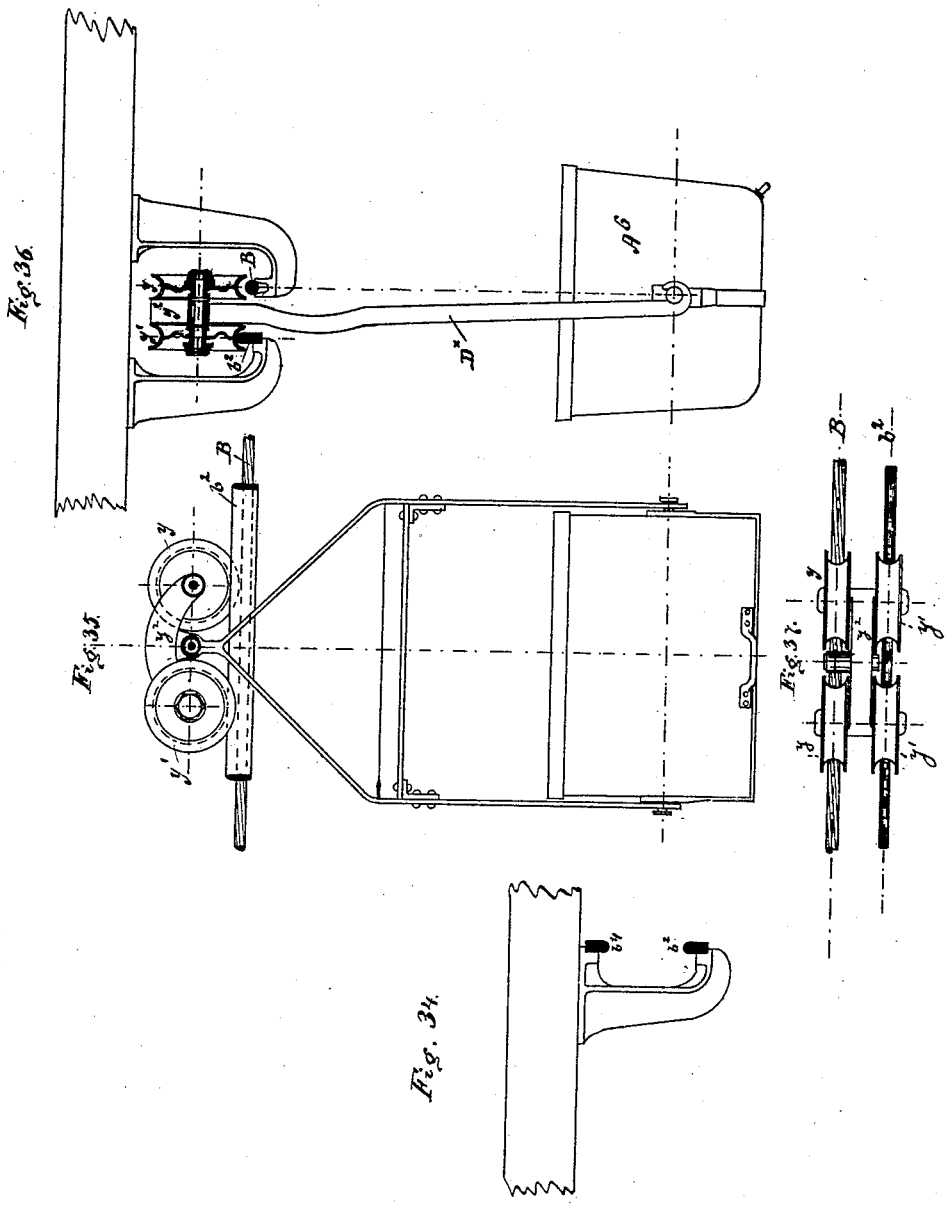
(No Model.)

11 Sheets—Sheet 9.

A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.



Witnesses.
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(No Model.) 11 Sheets—Sheet 10.

A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.

Fig. 38.

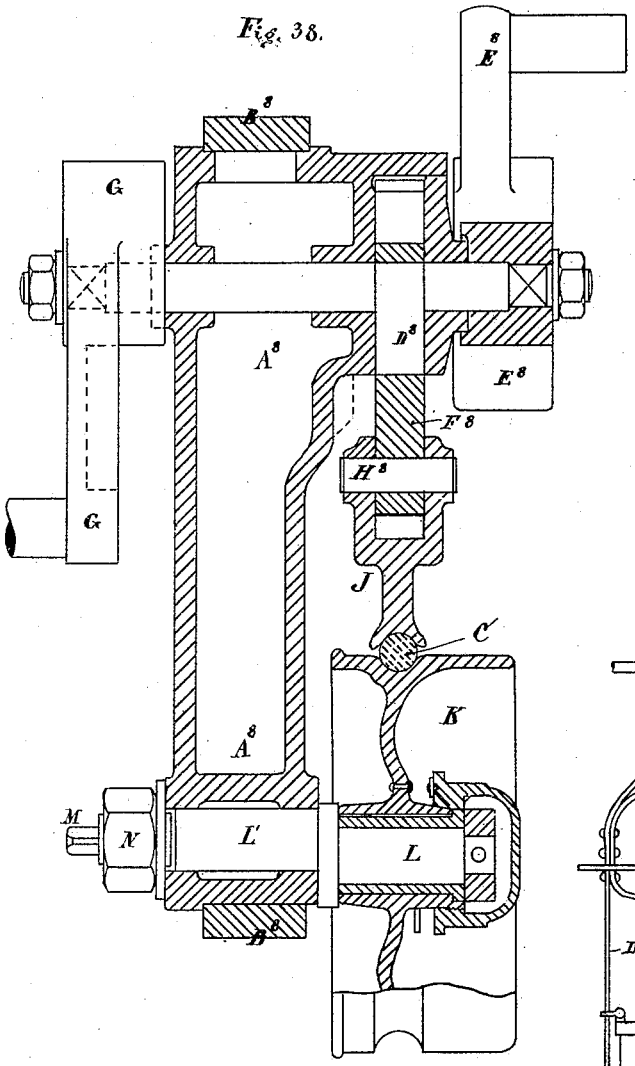
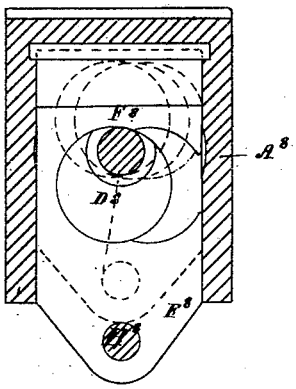


Fig. 39.



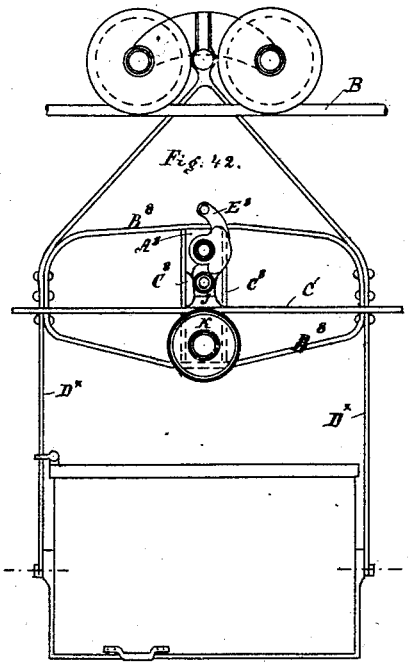


Fig. 42.

Witnesses.
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(No Model.) 11 Sheets—Sheet 11.

A. BLEICHERT & J. SCHATTE.

ELEVATED WIRE ROPE LINE.

No. 345,828. Patented July 20, 1886.

Fig. 40.

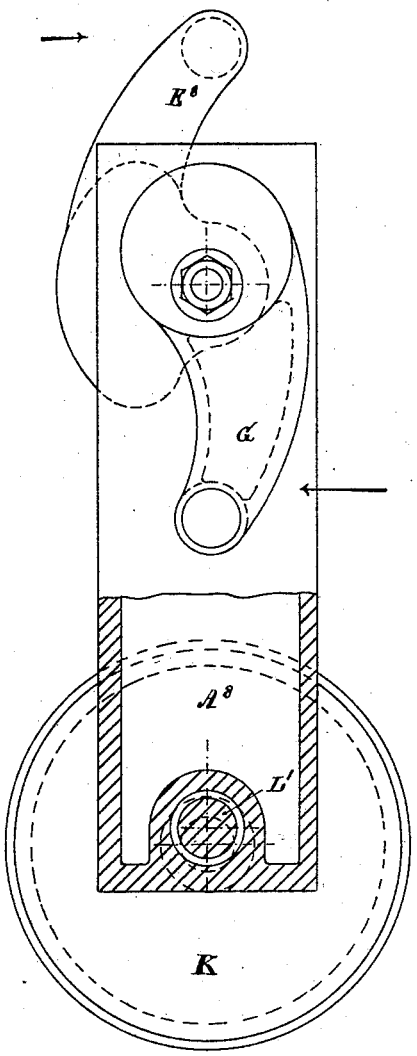
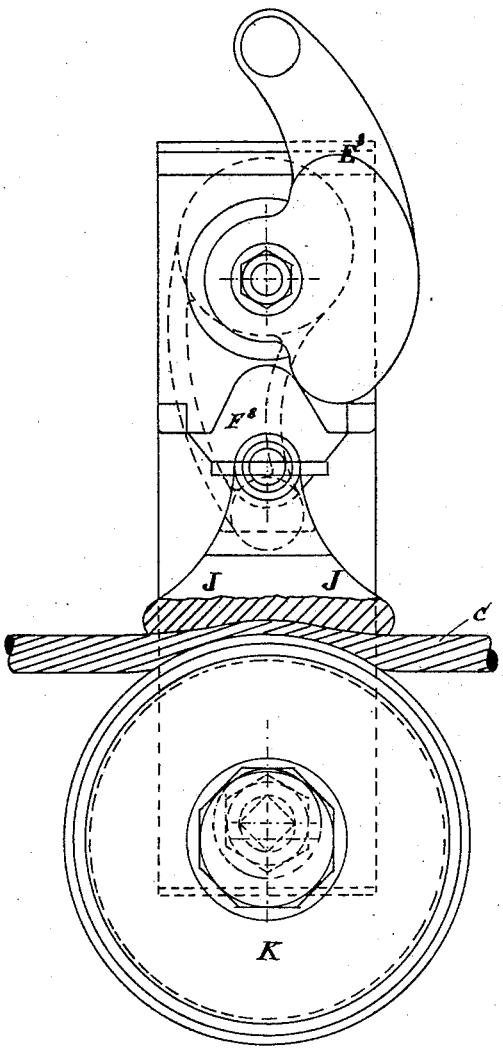


Fig. 41.



Witnesses.
T. Turner
Robt. H. Ray

Inventors.
A. Bleichert & J. Schatte.
per Bakewell & Briesen
Attorneys

UNITED STATES PATENT OFFICE.

ADOLF BLEICHERT, OF GOHLIS, NEAR LEIPSIC, SAXONY, GERMANY, AND JULIUS SCHATTE, OF VIENNA, AUSTRIA-HUNGARY, ASSIGNORS TO ADOLF BLEICHERT & CO., OF GOHLIS, NEAR LEIPSIC, GERMANY.

ELEVATED WIRE-ROPE LINE.

SPECIFICATION forming part of Letters Patent No. 345,828, dated July 20, 1886.

Application filed February 25, 1886. Serial No. 193,207. (No model.) Patented in Germany August 22, 1882, No. 22,888, August 22, 1882, No. 22,947, December 5, 1884, No. 32,218, and June 18, 1885.

To all whom it may concern:

Be it known that we, ADOLF BLEICHERT, a resident of the city of Gohlis, near Leipsic, in the Kingdom of Saxony and German Empire, and JULIUS SCHATTE, a resident of the city of Vienna, in the Empire of Austria-Hungary, have invented certain Improvements in Elevated Wire-Rope Lines, of which the following is a specification, and for which Letters Patent have been granted in Germany, No. 22,888, dated August 22, 1882, and No. 22,947, same date; also German Letters Patent No. 32,218, dated December 5, 1884, as well as an application for Letters Patent in Germany, dated June 18, 1885.

Our invention relates to those systems of the so-called "elevated wire-rope lines" or "wire-rope suspension-line" in which the suspension-rope, on which the wagons containing the material to be transported run, is stretched in an elevated position above the ground, and which have a second rope, the so-called "draw-rope," which is continuously in motion and serves to pull the wagons.

The improvements specified herein relate to the method of connecting these wagons with the suspension-rope of the so-called "traverse;" to the appliances for bedding the suspension-rope, the so-called "traveling-shoes;" to the construction of the wagons, and especially of such for certain materials; to the arrangements for allowing the wagons to pass each other when only one suspension-rope is used, and to the contrivances for connecting the vessels with the draw-rope, the so-called "coupling."

In the accompanying designs, Figure 1 shows a complete front view of the system of wire-rope suspension-lines, and Fig. 2 represents a ground plan of the whole, while Fig. 3 shows on a larger scale a cross-cut, in which the metal supports for the pillars are visible. Figs. 4, 5, and 6 represent the construction of the traverse. Fig. 4 presents a front view of it; Fig. 6, a ground plan, and in part a section, whereas Fig. 5 is a side view and section on the line I II in Fig. 4. Figs. 7 to 10 represent the application of the traveling-shoes and their construction. Fig. 7 is a longitudinal section, Fig. 8, a ground plan, and Figs. 9 and 10 are cross-cuts on the lines III IV and V VI in Fig. 7. Figs. 11 to 30 show various constructions of the suspension-line wagons, as are used in particular for the transport of liquid material, as, for instance, blast-furnace cinder. Of these figures Fig. 11 shows a front view and in part a section. Figs. 12 and 13 are separate parts of the suspension-strap. Fig. 14 is a side view and in part a section. Figs. 15 and 16 are front view and ground plan of the carriage, (drawing-cage.) Figs. 17 and 18 show separate parts of the tripping appliance, (strap.) Figs. 19 to 22 represent a similar suspension-wagon, with rather different joinings of the upper and under parts in the carriage, (drawing-cage.) Fig. 19 is a front view, and in part a section; Fig. 20, a side view, and likewise in part a section, whereas Figs. 21 and 22 represent front view and ground plan of the carriage and show the method of joining the upper and under parts. Figs. 23 to 27 represent a suspension-wagon, in which the parts of the cage are connected by means of a wrought-iron casing. Fig. 23 shows the lower part of the wagon, with a section of the carriage seen from in front. Fig. 24 is a ground plan, Fig. 25 a cross-section through this vessel. Figs. 26 and 27 show a front view and a ground plan of the way in which these vessels are filled direct from the blast-furnaces. Figs. 28 to 30 represent the construction of the vessels with intermediate pieces, Fig. 28 being an elevation partly in section, Fig. 29 a ground plan, and Fig. 30 a lateral section through this vessel. In Figs. 31 to 37 the arrangement of the shunting places is shown and how they are used in order to allow the wagons to travel backward and forward on one suspension-rope only and how they pass each other at these places. Fig. 31 shows a longitudinal section of this arrangement. Fig. 32 is a ground plan of it, and Fig. 33 a side view. Fig. 34 shows the pillow-block with the depressed points of the switches. Fig. 35 is a front view,

and Fig. 36 a side view, of the carriage with the traverse which is provided with the shunting appliance, while Fig. 37 shows the arrangement of the wheels of the traverse and how they must necessarily be for the purpose in question. In Figs. 38 to 42 the coupling appliance with the draw-rope is represented. Fig. 38 is a cross-cut through the entire arrangement, and Fig. 39 is a side view indicating the application of the eccentrics. Figs. 40 and 41 represent the eccentric levers and the chuck, while Fig. 42 represents an entire wagon, with traverse and coupling on a small scale.

In the entire arrangement represented in Fig. 1, A A are nave-supports, made in any desirable shape, on which rest in cross-beams E the cast-iron shoes required for bedding the suspension-rope B B.

C is the draw-rope.

D D′ D² are a number of wagons traveling on the suspension-rope in the directions indicated by the arrows, and drawn by the draw-rope to their destination.

The traverse for the suspension-rope wagons represented in Figs. 4 to 6 has a suspension of the wagon-suspender, which is in the axis of the center of gravity of the wagon. This traverse consists of a peculiar shaped cast-iron body, A′, the purpose of which is to take up the axles of the two wheels B′ B′, and a pivot, C′, for the suspension of the wagon-suspender $D^{\times}$. This pivot C′ is in the center of the traverse A′, and is joined firmly to the wagon-suspender $D^{\times}$.

The hub E′, which is cast on the traverse A′ and intended for the pivot C′, is placed between the two wheels of the wagons, and is arranged in such a manner that its center line falls almost into the axis of the center of gravity of the wagon. The wagon-suspender hangs therefore with its fixed pivot C′ in the hub E and can swing on this point. This suspending of the wagon-suspender in the axis of the center of gravity of the wagon offers the one very material advantage that the axles B′ B′ are always equally weighted, and consequently there can be no one-sided wear of the axles and boxes, nor can the traverse hang slanting to the wheels.

The screw F′ serves to press in sufficient oil for lubricating the pivot C′.

The eccentrically-shaped body G′, which trails loose between the cast edges of the two wheels, is intended to prevent any backward motion of the wheels and likewise of the wagon.

The shoe, which is used for bedding the suspension-rope in, and which is shown in Figs. 7 to 10, is made movable, so that it can follow the slight swinging motions of the suspension-rope without causing the latter to slide in its bed. This shoe has, besides, a safety-strap to prevent the suspension-rope from being lifted out of it.

The shoe A^2, which is intended for the suspension-rope to rest in, and is hollowed out semicircularly on top, has a pair of rollers, B^2 B^2, at each end, and moves on them in the sliding guide C^2, which serves at the same time as connecting-piece with the wooden or iron head-piece E of the supports A.

The two peculiarly-shaped safety straps or caps $D^{\times 2}$ $D^{\times 2}$ are intended to prevent the suspension-rope from springing off the shoe A^2. For this purpose the two checks L^2, wrought onto the safety-straps $D^{\times 2}$, encircle the rope, and are joined to the shoe by means of the bolts E^2 E^2; but sufficient space is left between the safety-straps and the suspension-rope to allow the latter to move without hinderance at any time. The upper part of each safety-strap terminates on the one side in a tongue running to a sharp point, so to lie close onto the rope, and thus prevent any heavy shocks when the wagons are traveling along the line. When a wagon passes only, the point of each safety-strap will therefore come in contact with the suspension-rope, whereas the safety-straps themselves rest on their bolts E^2 and E^2, and leave the rope untouched.

In order to prevent the body A^2 from being lifted out of its guides, a bolt, F^2, is applied to the guide C^2, which, also passing through the long slit made in the body A^2, allows the latter to move horizontally, but not vertically.

In case dry materials are to be transported, the suspension-line wagons are provided with vessels in the shape of common boxes or bodies; but when the wagons have to convey liquid matter the vessels are of a different shape, as will be described hereinafter in detail.

The cast-iron or cast-steel box or body represented in Figs. 11 to 18, and especially intended for the conveyance of liquid slag, is shaped like a tray or trough, and consists of an under and an upper part, which are held together by means of a wrought-iron frame. The frame consists of the under piece or strap, A^3, and the three cross pieces or straps B^3. The under strap and the center cross-strap have their upper ends bent in the shape of hooks Q, in order to form a support for the main wedges $D^{\times 3}$, which are laid onto the catches E^3, cast onto the upper part of the box. By means of these wedges the two parts of the box or frame and body B^4 are held firmly together. The lower piece or strap, A^3, has at the same time the two trunnions F^3 F^3, likewise the strap G^3, with a handle to enable the wagon-man to hold the box firmly when it is tipped.

In order to maintain the box in its horizontal position there are two forks, H^3, fastened onto one lengthened arm of the suspender $D^{\times}$, and between them is the strap G^3. One of these forks H^3 is stationary, while the other moves on the bolt S^3, Figs. 17 and 18. When the movable fork H^3 is struck back, the strap G^3, with its handle, is at liberty and the box can be tipped then.

On the upper part of the box or body B^4 there are on the opposite sides the two projec-

tions J^3 J^3. The purpose of these is to join the wagons, which are next to each other quite closely, so that the continually-running stream of slag finds an uninterrupted groove for it to pour into, and thus prevent any oversplashing of the slag when the wagons are moved forward after being filled.

For the protection of the coupling apparatus, the axles, and the wheels of the wagon against the heat emitted by the hot slag, two metal sheets, K^3 K^3, are applied and are joined together by standing bolts. These sheets are brought in direct connection with the arms of the wagon-suspender $D^\times$ by means of the corner-cramps L^3.

The wagon box or body shown in Figs. 19 to 22 consists likewise of an upper and an under part of a similar shape; but the two parts are joined together in a different way. The box or body B^4 is placed in this instance in a casing, B^5, made of strong sheet metal, which incloses the lower part of the box or body entirely and the upper part partially. Four lugs, M^4, are riveted onto the metal casing, and four corresponding lugs, N^4, are cast on the upper part of the box. The connection is then effected by screws O^4, which fit into these lugs.

In the box or body shown in Figs. 23 to 27 the joining of the two parts is effected by means of a wrought-iron casing, R, which, however, does not fit close to the sides of the cast-iron box or body, but is, on the contrary, at some distance from them, and the intermediate space thus left between the inner and the outer boxes is filled with water to make the slag contained in the former and wagon itself cool all the quicker. The projections P^5, cast on the under part of the box, serve as rests for the sheet-metal casing. The outer casing, R, is fastened to the inner box, or, rather, the upper part of it, in the same manner as was explained before by means of two wedges, $D^{\times 3}$.

The vessel represented in Figs. 28 to 30 is constructed either of wrought-iron, fluid iron, or steel, and consists of the two ends *a a* with the projections J^3 J^3, and also the intermediate pieces, *b b b*. These pieces are riveted to a lower plate, *c*, and the two laterally-applied plates *d d* firmly together, and form in this combination the vessel intended for the reception of the liquid slag. The separate parts of the vessel—that is to say, the end walls, *a*, and the intermediate pieces, *b*—are not jointed quite tight together, but an intermediate space is left between each pair of them of about two to three millimeters wide, so as to allow them to expand as they require, and each piece for itself when the hot slag is in the vessel. The trunnions F^3 F^3 are riveted into the plates G^2 and G^3. The plate G^3 serves further in its projection as a handle to be used in tipping the vessel.

The arrangement which allows two wagons traveling on a suspension-rope line and in different directions to pass each other is represented in Figs. 31 to 37. The purpose in question is effected in this arrangement by providing the traverse with four wheels instead of with two, as formerly, two of them being on each side of the suspension-rope. The meeting and passing of wagons traveling in opposite directions on a single gage-wire rope or suspension-line is thus rendered possible by this arrangement. This improvement is to be seen in the accompanying design, Figs. 31 to 37. Four wheels, *y y'*, are applied to the upper part of the wagon—the so-called "traverse"—in such a manner that two and two are on a level. The two levels run parallel, and in between is placed the traverse y^2 of the wagon, together with the suspension. The second pair of wheels, *y' y'*, which are not to be found in common traverse constructions, are on the outer side of the line, (with reference to the bedding of the suspension-line.) Fig. 32 shows the alteration of the line in the ground plan. B is the main line bedded on one side only. b' c' d' d^2 c^2 b^2 is the side line or shunting-line bedded on one side, which is curved in such a manner that the tracks b' c' d' d^2 and c^2 b^2 are parallel to the main line, and mounted in such a way that the shortest distance from the middle of the main line to the point b' and b^2 is equal to the space of the wheel-pairs *y y* and *y' y'*, Figs. 36 and 37. The track d' d^2 is so far distant from the main line as the breadth of the wagons and the play allowed them requires. The shunting-line is, moreover, bent downward at both ends and bedded in such a way that points b' and b^2 are both on a level with the opposite highest points of the suspension-rope. The wagons A^6 and B^6, which are traveling, for instance, on the main line, are coupled to one common draw-rope, but move in opposite directions. Wagon A^6 is provided with one pair of wheels *y y*; but wagon B^6 has two pairs, *y y* and *y' y'*. When wagon B^6 reaches the point b^2 of the side line, the pair of wheels *y' y'* passes onto the latter. Owing to the double curve of the side line the pair of wheels *y y* are lifted, when the wagons travel on from off the main line and wagon B^6 proceeds on the pair of wheels *y' y'* and on the side line only till it reaches the other end of the latter, where it passes, owing to the double curve again, back onto the main line, and, hanging from the pair of wheels *y y*, continues its course on it. While wagon B^6 had left the main line and was traveling on the side line, wagon A^6 had continued its course on the main line, because it is provided with one pair of wheels only, and because the side line offered no obstruction to it, and thus the wagons had passed each other. In order to prevent the wagon, when on the side line, from being drawn off laterally by the draw-rope, a check-rail, b^4, Fig. 34, can be laid over the side line and made to engage the pair of wheels *y' y'*.

The construction of the coupling apparatus

is shown in Figs. 38 to 42. In it the main part A^8 of the coupling is a hollow cast body, and is fixed inside of a strap, B^8 B^8, Fig. 42, which latter is fastened to the wagon-suspender $D^\times$. The strap B^8 is connected with the apparatus in the most simple manner, namely, by means of the two screws C^8 C^8, which are situated on both sides of the casing A^8 of the apparatus and join the upper and under parts of the strap B^8 B^8 together. By tightening these screws the whole apparatus is pressed firmly between the two arms of the strap and held immovable by them. By easing up the screws the whole apparatus can be easily removed from the wagon-suspender. In addition to this the connection of the apparatus with the wagon-suspender by means of strap B^8 B^8 is exceedingly solid. A little fluted roller, K, serves as a guide and bed for the draw-rope C. It is fastened onto the pivot L, attached to the main part A^8. The draw-rope C rests on this roller K, which serves besides, when the wagon is stopping at a station, as a guide-pulley for the wire rope, which is continually moving. For coupling the wagon with the draw-rope a chuck, J, is fixed above the roller K. The chuck is bedded, so as to revolve on the horizontal pivot H^8 in a sliding rod, F^8, which runs vertically. By means of an eccentric, D^8, this sliding rod F^8, together with the chuck J, can be moved vertically. On the axle of this eccentric there is a peculiarly-shaped lever, E^8, put in a vertical position. The sliding rod F^8, together with the chuck J, are thus brought into the lowest position and the chuck is made to bear upon the draw-rope. When the rope is pulled, the chuck turns slightly, and, owing to this, presses all the harder against the rope. The axle on which the eccentric D^8 is placed is formed herein into a regular shaft which passes through the back end of the casing of the apparatus, and has its third bearing there. The disengaging-lever E^8 is fastened to the front end of the axle of the eccentric D^8, whereas the other end has a second disengaging-lever, G, but it is placed at an angle of one hundred and eighty degrees to the other. The first of these levers serves to disengage the apparatus while the wagon is running from one end station to the other, and the second does the same on the return. The apparatus effects, therefore, in the simplest manner an uncoupling of the wagons at each terminus of the suspension-line when the motion of the wagon alternates. The sliding rod F^8 bears on its lower end, and revolving easily on the bolt H^8 the peculiarly-shaped chuck J, the under side of which is formed slightly concave and hollowed out sufficiently to correspond with the diameter of the rope. In its lowest position—the engaged one—the part J comes to bear with its concave side and with slight pressure on the rope. The motion of the rope causes it to make a slight revolution in the direction of motion of the former, and at the same time to press the rope all the harder against the roller. The connection of the draw-rope with the apparatus is thus made in a perfectly safe and reliable way.

In order to be able to adjust the coupling apparatus easily for the diameter of the rope, the guide-pulley is to be made to be raised or lowered, or, rather, to be approached to or removed from the part J. For this purpose the front part of the pivot L, on which the guide-pulley moves, is arranged eccentrically against the back part of the pivot L′. By means of a slight turning of the pivot L′, which is bedded in the casing A^8, (the square M is applied for this purpose,) the roller K can be raised or lowered in the simplest manner. The nut N, which is fixed on the back end of the pivot L, serves to hold the latter in the end position.

Having thus described our invention, and also the different means how to perform it, what we claim, and desire to get secured by Letters Patent of the United States, is—

1. In combination with the cross-piece E, the support C^2, movable shoe A^2, and safety-straps $D^{\times 2}$, substantially as specified.

2. The combination of shoes A^2 and rope B with safety-caps $D^{\times 2}$ $D^{\times 2}$, of semicircular form, and with lugs L^2 L^2 and bolts E^2 E^2, substantially as specified.

3. The combination of the peculiarly-shaped box B^4, consisting of an upper and an under part, with projections J^3, catches E^3, wrought-iron frame for joining the two parts of the box, trunnions F^3 F^3, wedges $D^{\times 3}$, and check-strap G^3, substantially as specified.

4. The combination of box B^4, suspenders $D^\times$, and movable forks H^3 H^3, bolt S^3, and strap G^3, substantially as specified.

5. The combination of the wagon-suspender $D^\times$, the wagon B^4, and the protection-sheets K^3 K^3, substantially as specified.

6. A wagon-box for transporting fluid slag, in combination with an outer casing, R, as and for the purpose specified.

7. The combination of the body of the traverse y^2 with two pairs of wheels, y y y' y', each pair of wheels lying on one level, one pair of wheels, y y, being for the main suspension-line B, and the other pair, y' y', situated on the other side of the traverse y^2, being for the side line, substantially as specified.

8. The combination of the coupling apparatus A^8 with the wagon-suspender $D^\times$ and with a strap, B^8, between the two parts of which the apparatus A^8 is placed and held fast, substantially as specified.

9. The combination, with a casing, A^8, forming a hollow cast body, the shaft of the eccentric D^8, the axle L′, of the roller K, the sliding rod F^8, and chuck J, substantially as and for the purpose described.

10. In combination with the casing A^8, the shaft of the eccentric D^8, having three bearings in said casing, two in front, between which the eccentric D^8 is situated, and one outer bearing in the back end of said casing A^8, substantially as specified.

11. The combination of the disengaging-levers E^8 and G, eccentric D^8, sliding rod F^8, and chuck J with the draw-rope C and pulley K, arranged to operate in the manner and for the purpose specified.

12. The combination of frame A^8 and eccentric bolt L′ with the eccentric pivot L, for bedding the guide-pulley K, all being so constructed that the guide-pulley is lowered by turning said bolt L′, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ADOLF BLEICHERT.
JULIUS SCHATTE.

Witnesses to the signature of Adolf Bleichert:

C. BORNGRAEBER,
HERMANN STOECKEL.

Witnesses to the signature of Julius Schatte:

EDMUND JUSSEN,
OTTO SCHEFFER.