

(No Model.)

3 Sheets—Sheet 1.

W. F. BRAUN.
CAR COUPLING.

No. 405,457.

Patented June 18, 1889.

Fig. 1.

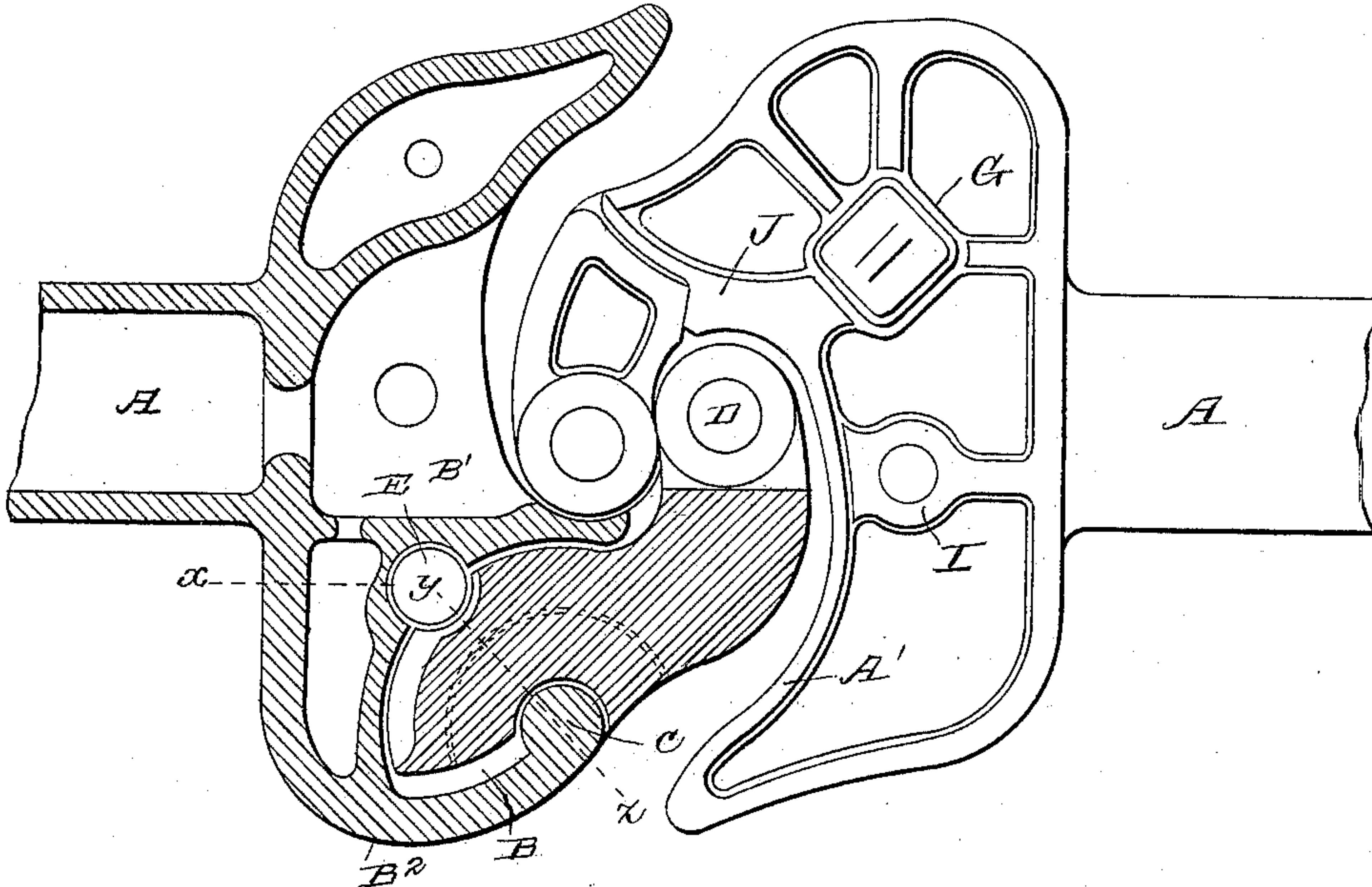


Fig. 2.

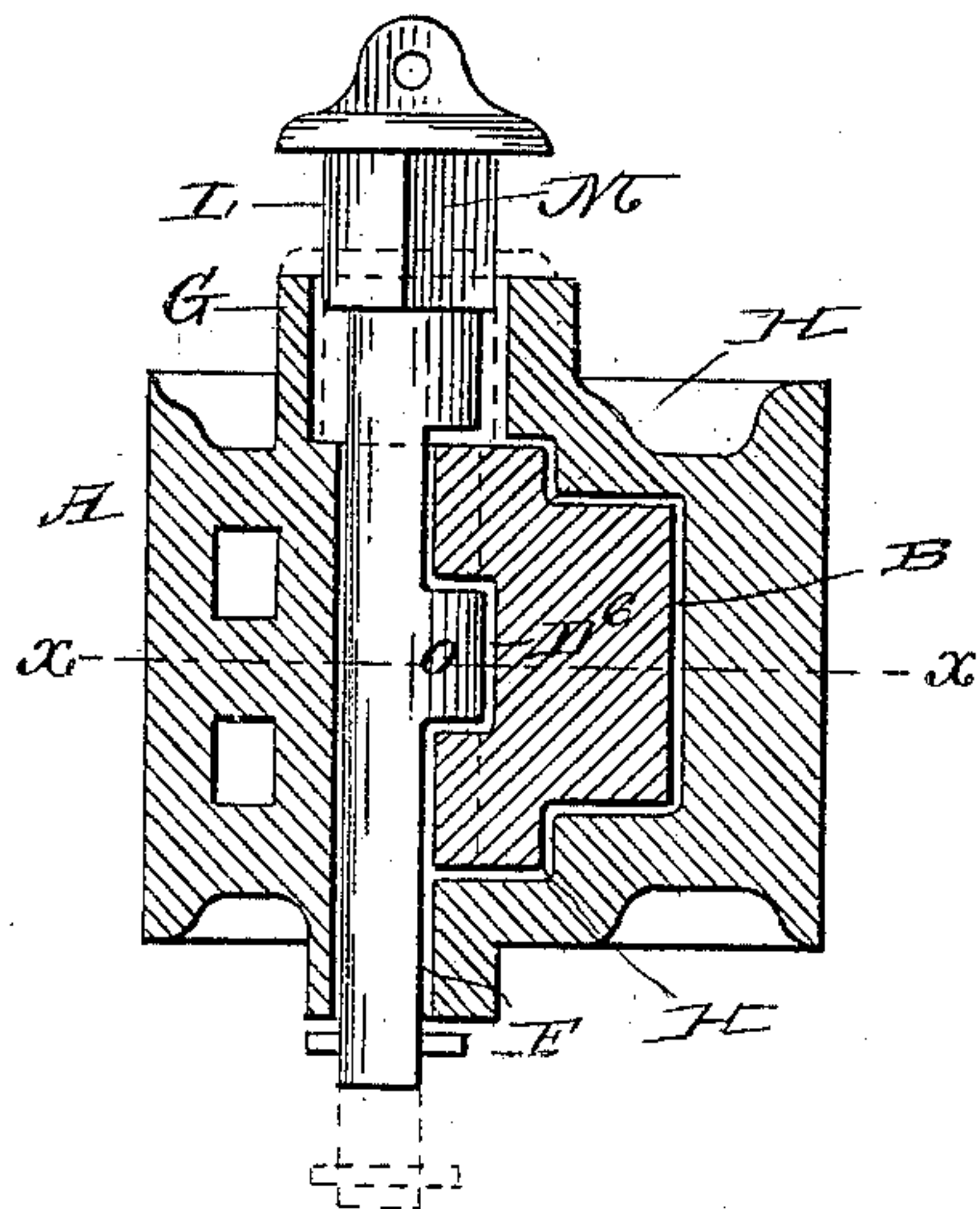


Fig. 3.

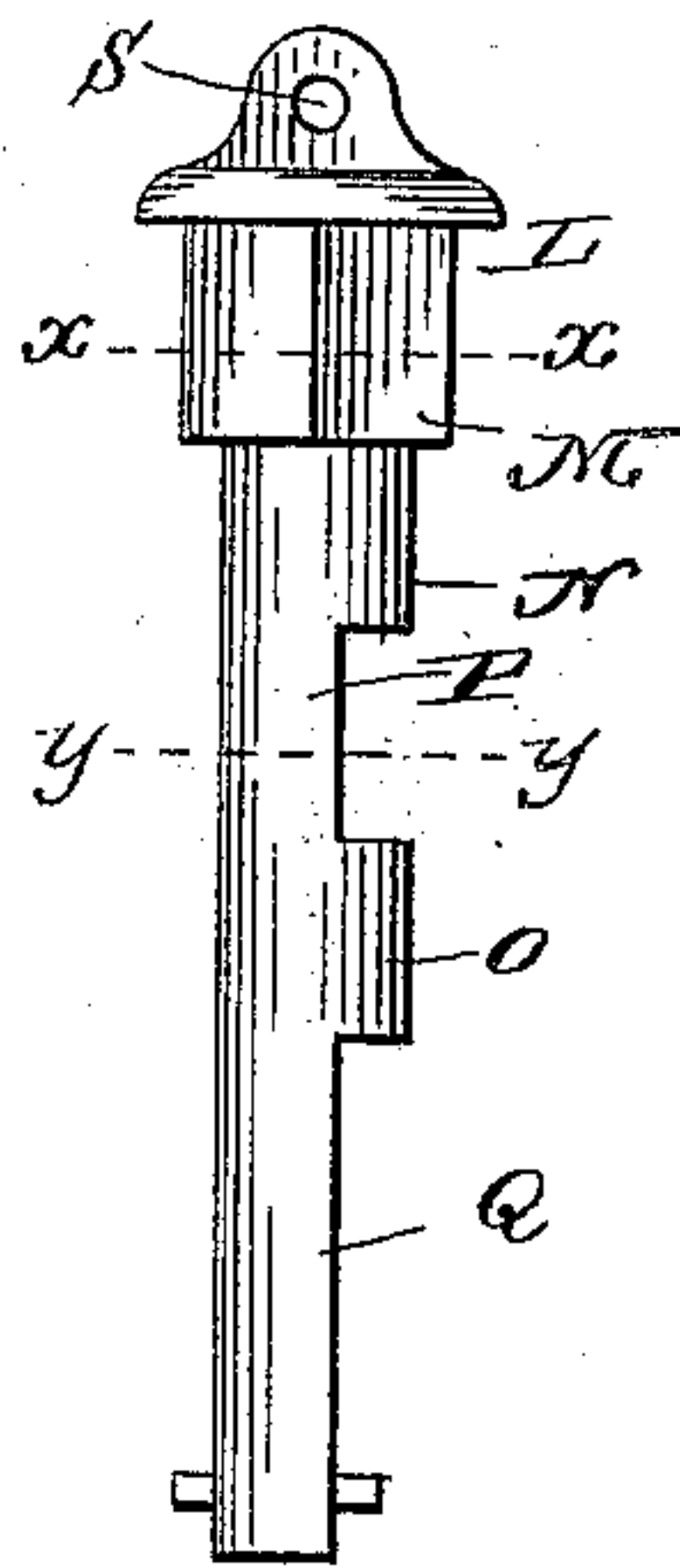
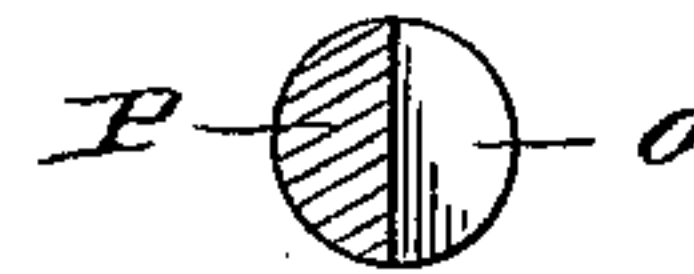


Fig. 4.



Fig. 5.



Witnesses

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Fig. 6.

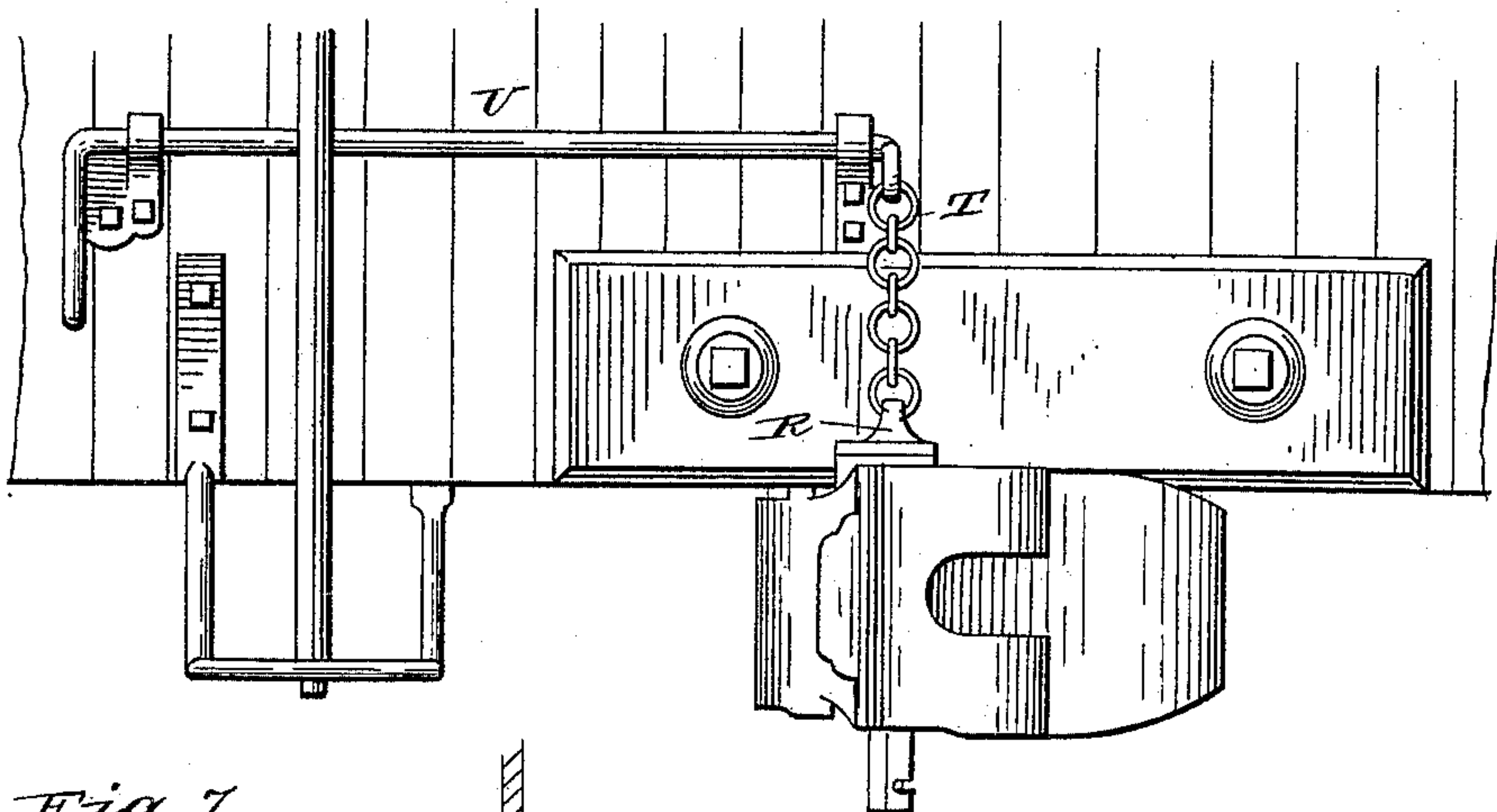


Fig. 7.

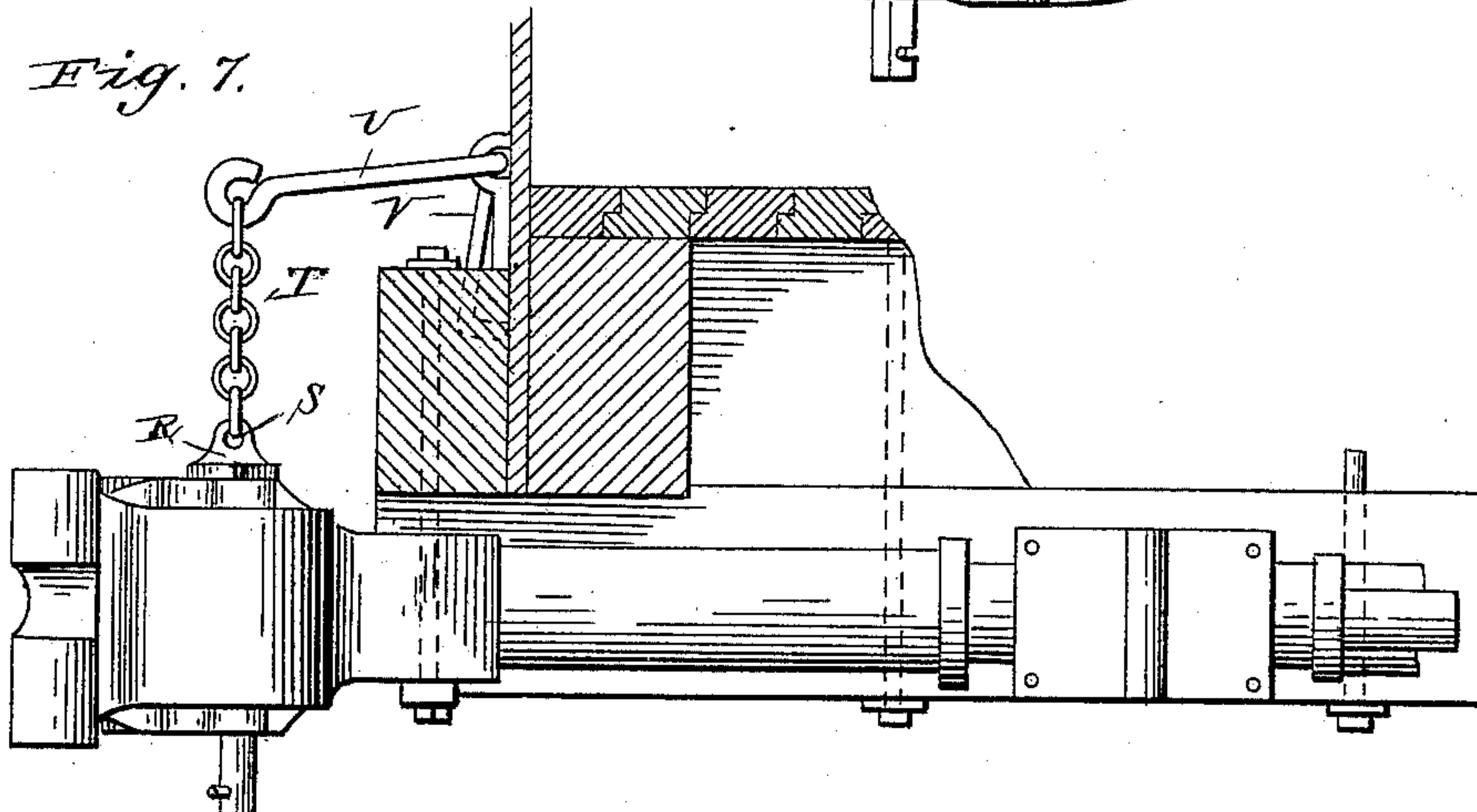
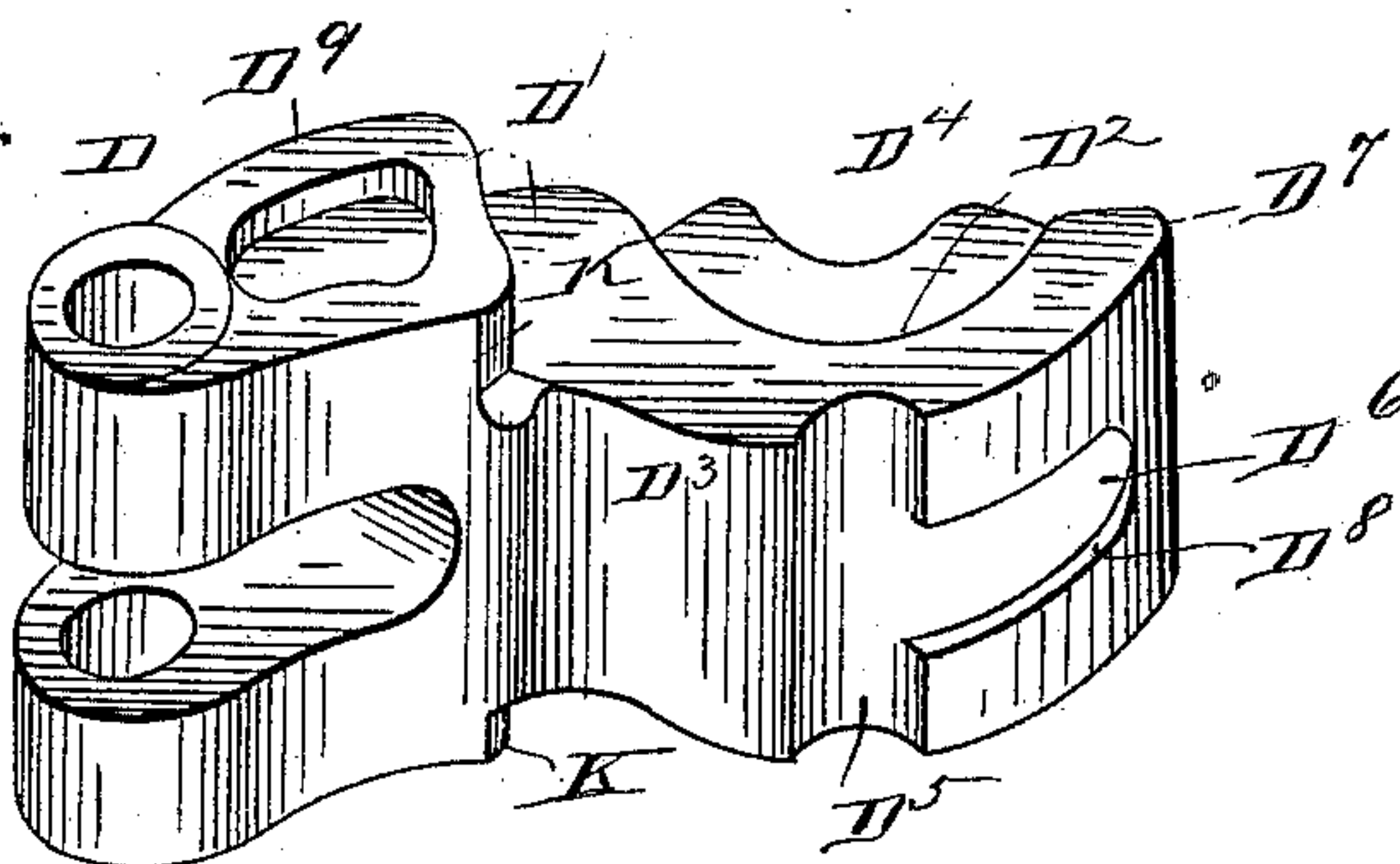


Fig. 8.



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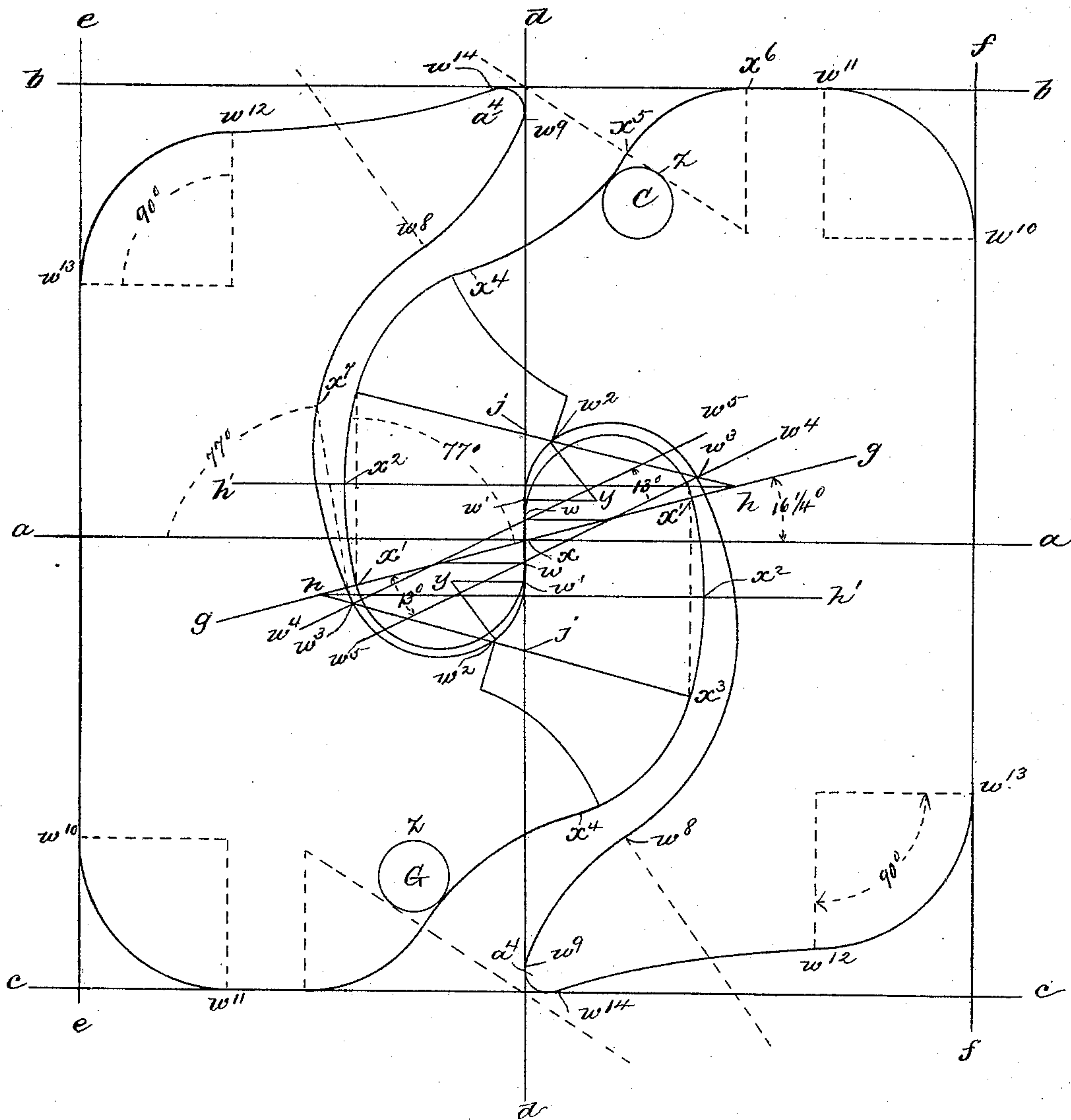
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Fig. 9.



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UNITED STATES PATENT OFFICE.

WILLIAM F. BRAUN, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS,
TO THE CONSOLIDATED COUPLING COMPANY, OF SAME PLACE.

CAR-COUPLING.

SPECIFICATION forming part of Letters Patent No. 405,457, dated June 18, 1889.

Application filed March 19, 1889. Serial No. 303,830. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. BRAUN, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Car-Couplings; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

My invention has special reference to the construction of vertical plane couplers of the style generally known as the "Dowling" coupler.

The invention consists more particularly in certain details of construction, whereby the coupler is improved and made better able to meet the conditions required in practice.

My improvements may be divided into three parts: First, that relating to the configuration of the coupler—that is to say, the mathematical and geometrical lines upon which it is formed; second, the mechanical relations of the movable knuckle with the draw-head, and, third, the latch and locking pin employed with the draw-head and knuckle.

Figure 1 shows two couplers in the position they would occupy when coupled. The left-hand coupler is shown in horizontal section and the right-hand in plan view. Fig. 2 is a vertical section on line $x y z$, Fig. 1; Fig. 3, an elevation of the latch or locking pin. Figs. 4 and 5 are transverse sections of the locking-pin, respectively, on the lines $x x$ and $y y$ of Fig. 3; Fig. 6, a front elevation showing the coupler attached to a car, and also showing, incidentally, a mechanism which may be employed for operating the locking-pin. Fig. 7 is a side elevation of the coupler attached to a car. Fig. 8 is a view in perspective of the movable knuckle detached from the draw-head; Fig. 9, a diagram showing the manner of laying out my coupler.

A represents the draw-head, which may be of any suitable material, preferably malleable iron or cast-steel. At one side of the draw-head is an arc-shaped slot B, located between the walls B' and B'' . Near the outer end of the wall B'' is the cylindrical projection C,

which forms the center of rotation for the knuckle D. At about the center of the wall B' , which is concentric with the projection C, I arrange the semi-cylindrical vertical opening E, semi-cylindrical over its middle portion and through that part which is carried through the bottom plate F of the draw-head. In the top of the draw-head and in line with the opening E, I provide the cup-shaped projection G, rectangular in section. The arc-shaped opening B in the body of the draw-head has the shoulders H H formed on the top and bottom plates, which shoulders are located by the dotted lines in Fig. 1, and are concentric with the projection C or inner face B' of the draw-head.

I represents an opening formed through the top and bottom plates of the draw-head and through which an ordinary pin may be dropped for the purpose of connecting the draw-head through an ordinary link with a common draw-head, should the knuckle D be in any manner injured as to render it unfit for service.

The top and bottom plates of the draw-head are provided with the shoulders J, which form a bearing-surface for corresponding shoulders on the knuckle D, and which serve to resist a portion of the buffing-strain in the axial line, or in a plane corresponding thereto of the axis of the coupler.

The knuckle, Fig. 8, may be of any suitable material, preferably, however, of forged wrought-iron. The knuckle consists of the coupling-hook D and the stem D' . The curvature of the stem is the same as that of the arc-shaped recess B in the coupling-head. The surfaces $D^2 D^3$ are concentric with the projection C of the draw-head. In the surface D^2 of the stem I provide the vertical depression D^4 , which when the knuckle is inserted in the draw-head fits over the projection C. Opposite to this depression is the vertical depression D^5 , which registers with the opening E of the draw-head. On this same face is the horizontal slot D^6 , similar in depth to the vertical slot D^5 , and carried back and ending in the stem D' , and in the top and bottom of the stem are the shoulders $D^7 D^8$, which correspond to the shoulder H in the

draw-head. To insert the knuckle into the draw-head, it is necessary to bring the end of the knuckle well to the side on which the orifice B is located. The shoulders D^7 D^8 take
5 under the shoulders H of the draw-head and bear thereon, so that when traction is exerted on the end of the knuckle all the strain (the latch-pin not being inserted) is borne by the shoulder H of the draw-head.

10 K K are buffing-shoulders on the knuckle, which when the knuckle is closed bear upon the shoulders J J of the draw-head. The motions of the knuckle are in the arc of a circle, the axis of the circle being the center of the
15 part C. The outer face of the knuckle D^9 I prefer to make oval in shape and to correspond with the interior buffing-face A' of the draw-head. My object in making the face of the knuckle of this shape is twofold—to
20 have it conform to the cavity of the draw-head, and, second, to decrease the leverage of the knuckle-stem for a buffing-blow. In other words, the buffing-point is carried near the fulcrum C.

25 The locking device consists of a vertically-moving pin L, Fig. 3, which is made to conform in shape to the opening G through the draw-head. The pin is square at the top M, cylindrical at N and O, and semi-cylindrical
30 at P and Q. The part M corresponds to the opening G, the cylindrical portion to the opening E, and the semi-cylindrical portion at the bottom of the pin to the opening F in the bottom plate of draw-head. At P and Q the pin
35 is cut away, which leaves part O projecting as a lug from the semi-cylindrical surface P and Q. The part O corresponds to the horizontal slot D^6 of stem D^7 of the knuckle.

The operation of the pin will be readily understood. When the knuckle is in position
40 shown in Fig. 1, the openings E of the draw-head and D^5 of the knuckle correspond and the pin drops to the position shown in the dotted lines, Fig. 2, thus providing a bearing
45 for the shoulders D^7 and D^8 on the cylindrical portion of the pin. When the pin is lifted to the position shown in Fig. 2, the lug O corresponds to the slot D^6 , and as the knuckle is moved outward in uncoupling the lug O moves
50 in the recess D^6 until it strikes the solid portion of the stem and the end of the slot, thereby limiting the motion of the knuckle. The object in making the pin square at the top and semi-cylindrical where it passes through
55 the bottom plate is to prevent the pin from turning with the movement of the knuckle, and by means of the semi-cylindrical section of the body of the pin it just fills the space E in the wall B', and the knuckle moves over it.
60 The advantage of this construction over other forms of pins is that vertical motion of the pin is very much reduced.

R represents a lug on the top of the pin, through which there is a hole S, by which a
65 chain T may be connected and united to a lever U, which may be actuated by a lever V on the side of the car.

One of the most important features of my invention consists in the method employed for determining the mathematical and geometrical lines upon which the coupler shall
70 be constructed.

Referring to Fig. 9, $a a$ represent the line of draft, and $b b$ and $c c$ lines parallel to and eight inches therefrom. $d d$ is a line at right
75 angles to $a a$, and is the line upon which the inner or traction surfaces of the knuckles meet. The knuckles, as will be seen, are straight on their inner face and curved on their outer face. $e e$ and $f f$ are lines drawn
80 parallel to $d d$ and eight inches therefrom. The precise distance of the lines $d d$ and $c c$ from $a a$ or $e e$ and $f f$ from $d d$ I do not state as essential or consider as affecting the general design. The dimensions given are, how-
85 ever, those which I consider the most desirable and best adapted to meet the required conditions of strength, adaptability to the car, and the various motions of the car. Through
90 the point x at the intersection of the lines $a a$ and $d d$ draw the line $g g$ at an angle of sixteen and one-fourth degrees with the line $a a$, and fix the points y therein on each side of the lines $d d$ and one and one-half inch there-
95 from at right angles from these points as centers, and which may properly be considered as the centers of motion of the coupler as regards each other when in use. Draw the arc
100 $x' x'$, touching the line $d d$, so that this line will be tangent to both arcs. These arcs, it will be observed, form the end of the knuckle. Draw the lines $h' h'$ on both sides of the line
105 $a a$ and fifteenth-sixteenths of an inch therefrom, cutting the line $g g$ at h . With h as a center continue the curved line from x' by drawing the arc $x' x^3$, $x' x^2$ being equal to $x^2 x^3$, and thereby determining the curva-
110 ture of the buffing-surface of the knuckle. With the point j at the intersection of the radius $h x^3$, and the line $d d$ as a center, draw the arc $x^3 x^4$ in continuation of the curve, locate the center of motion of the hook—that is, the knuckle as regards the head—at the
115 point C, six inches from the line $a a$ and two inches from the line $d d$. From C as a center, with a radius of five-eighths of an inch, draw the circle z . Now, with a radius of four and one-half inches from x^4 , draw the arc $x^4 x^5$ as a continuation of the curve reversed from the
120 arc $x^3 x^4$, touching it at x^4 and touching the circle z . Taking a radius of two and one-half inches, continue the curve by drawing the arc $x^5 x^6$ reversed to the arc $x^4 x^5$, and touching it at x^5 and the line $c c$ at x^6 . Returning to the
125 point w on the line $d d$, lay out one and one-eighth inch on each side to find the points x' , from which, with a radius of one and five-sixteenths inch, draw the arc $w' w^2$, terminating at a point one-half an inch from the
130 line $d d$. From the center y continue the curve from w^2 to w^3 , a point on a line $w^4 w^5$, draw through the center y at an angle of thirteen degrees with a line $g g$, and thus forming the hollow which receives the end of the

knuckle—in other words, the buffing-face of the draw-head. Make the distance $w^5 y$ equal to $w^6 y$, and with w^5 as a center continue the curve from w^5 by drawing the arc $w^3 w^7$ equal in angle the arc $x' x^2$ of the knuckle. The angle of the arc $w^3 w^7$, made with a line $a a$, is an angle of seventy-seven degrees, and is the same as the angle made by the arc $x' x^3$ with the line $g g$. This angle provides a motion for the jaws within the head of thirteen degrees, which is the greatest angle that will ever be required in practice, assuming that the radius of any curve upon which the cars to which the coupler is fastened are employed will not be greater than thirty degrees. Continue the curve from w^7 by drawing the curve $w^7 w^8$, with a radius of four inches from the center j . Draw at the intersection of the lines $d d$ and $b b$ the nose a^4 , with a radius of one-fourth of an inch. Continue the curve from w^8 by a reversed curve with a radius of four and one-fourth inches, touching the curve of the nose a^4 at w^9 , the line $c c$ and $f f$, also the lines $e e$ and $b b$, having a radius of two and five-eighths inches. These lines $f f$ and $b b$, also the lines $e e$ and $c c$, are connected by the two curves $w^{12} w^{13}$ and $w^{13} w^{14}$. The curve $w^{13} w^{14}$ commencing on the line $f f$ or $e e$, four and one-fourth inches from the line $a a$, its radius is two and three-fourths inches and extends ninety degrees. The curve w^{12} and w^{13} connects the curve w^{13} and w^{14} with the curve of the nose a^4 . Its radius is seventeen inches.

Having thus described my invention, what I claim as new is—

1. In a car-coupler, the combination, with the draw-head having an arc-shaped slot formed therein, of a movable knuckle provided with an arc-shaped stem and a buffing-face substantially oval in shape, and the crown of the oval at about the center of the buffing-face, substantially as described.

2. In a car-coupler, the combination, with the draw-head having an arc-shaped slot formed therein and the arc-shaped top and bottom bearing-shoulders, of a movable knuckle provided with an arc-shaped stem, and the bearing-shoulders on the top and bottom of said stem, which register with the shoulders of the slot, substantially as described.

3. In a car-coupler, the combination, with a draw-head having an arc-shaped slot formed therein and a semi-cylindrical vertical opening for the locking-pin, of the movable knuckle provided with horizontal ribs on the arc-shaped face of said knuckle-stem, and a semi-cylindrical vertical opening for the locking-pin in the body of said stem.

4. In a car-coupler, the combination, with the draw-head having an arc-shaped recess formed therein, of a movable knuckle provided with an arc-shaped stem having ribs on the arc-shaped face of said stem, and a locking-pin square at the top and cylindrical at its upper and middle portions and semi-cylindrical between its upper and middle portions and at the lower portions of said pin.

5. As a latch-pin for a car-coupler constructed substantially as specified, pin L, square at the top, cylindrical at N and O, and semi-cylindrical at P and Q.

6. In a car-coupler, substantially as specified, a latch-pin hole square at the top and substantially concentric with the curved inner surface of the recess in the coupler-head, said latch-pin hole contracted at the bottom of the coupler-head to a semi-cylindrical form and lying entirely outside of the path in which the jaw moves.

7. In a car-coupler, the combination, with the draw-head provided with an arc-shaped slot, of the movable knuckle having an arc-shaped stem and oval buffing-face, the crown of the oval at about the center of the buffing-face, and a straight or substantially straight traction-face.

8. In a car-coupler, a draw-head the plane of the curvature of the buffing-face of which is at an angle of seventy-seven degrees with the axis of said coupler, substantially as set forth.

9. In a car-coupler, a knuckle the plane of the curvature of the buffing-face of which is at an angle of seventy-seven degrees with a line drawn through the center of said knuckle, or the point from which the arc which determines the shape of the end of the knuckle is struck, substantially as set forth.

10. In a two-part car-coupler the parts of which are identical in construction, the combination, with the draw-head the angle of the buffing-face of which is seventy-seven degrees to the axis of the draw-head, of the movable knuckle the angle of the buffing-faces of which is seventy-seven degrees with a line drawn through the center of said knuckle, whereby the angle of movement of the couplers relative to each other is one hundred and thirty degrees, substantially as set forth.

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Witnesses:

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