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CAR COUPLING.

No. 431,415. Patented July 1, 1890.

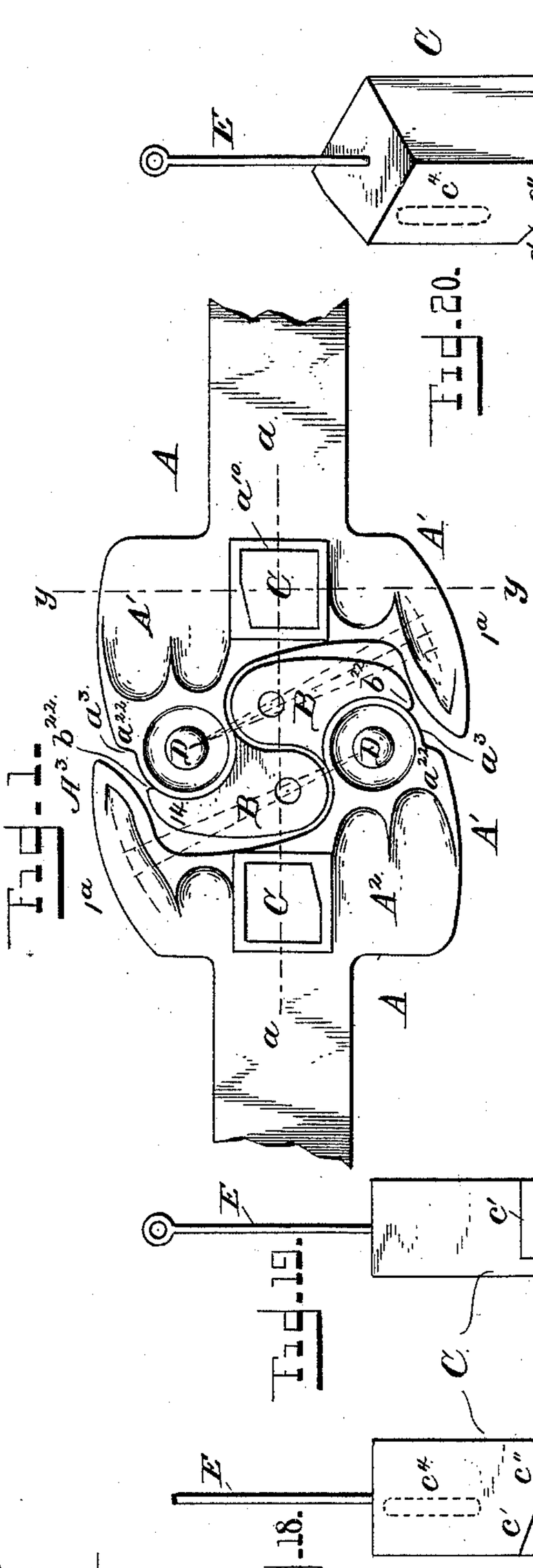

Fig. 1.

Fig. 20.

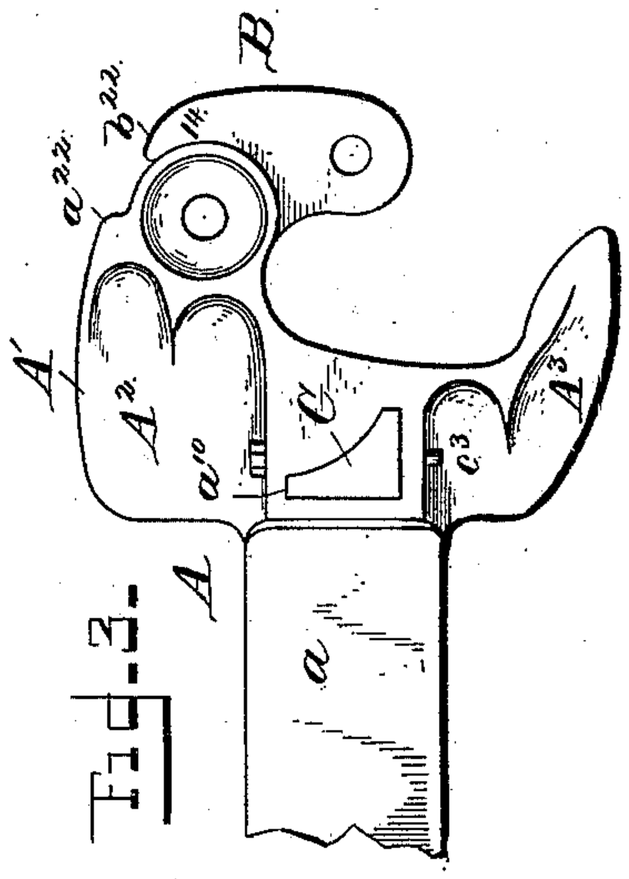

Fig. 3.

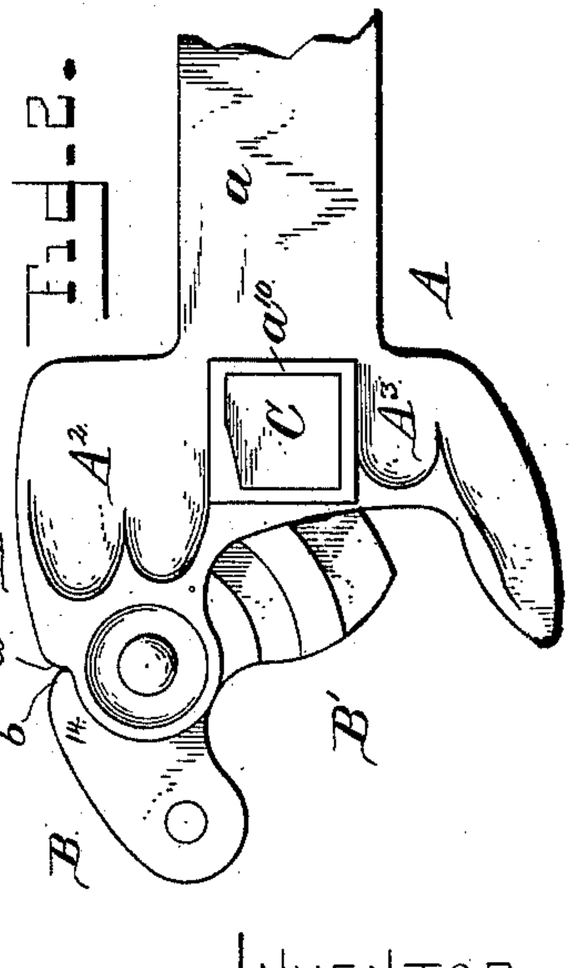

Fig. 2.

Fig. 19.

Fig. 18.

WITNESSES.

J. Thomson Cross

Phil. E. Rouzee

INVENTOR

William D. Thurmond

per Henry Orth

Atty

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Fig. 6.

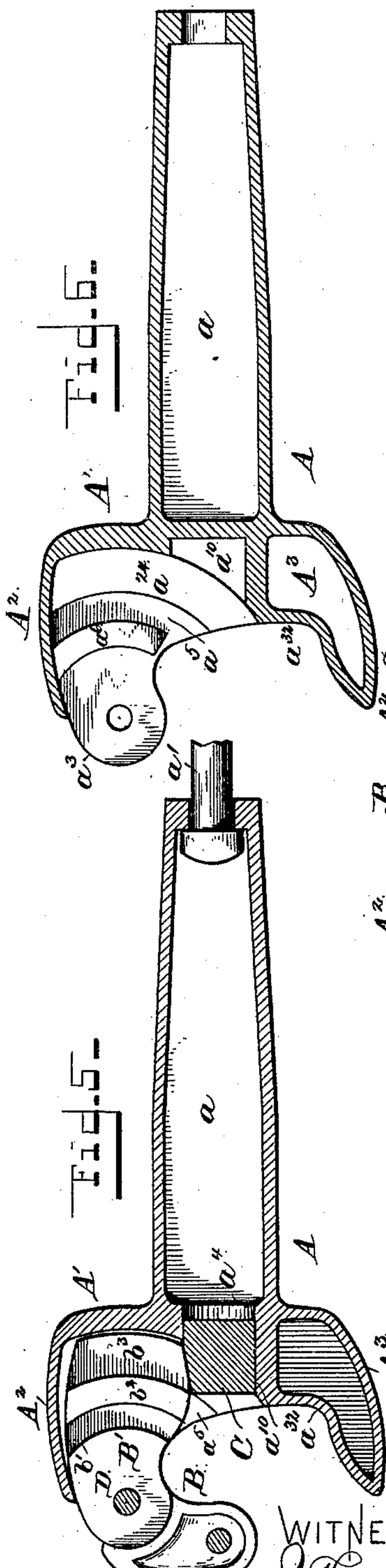

Fig. 7.

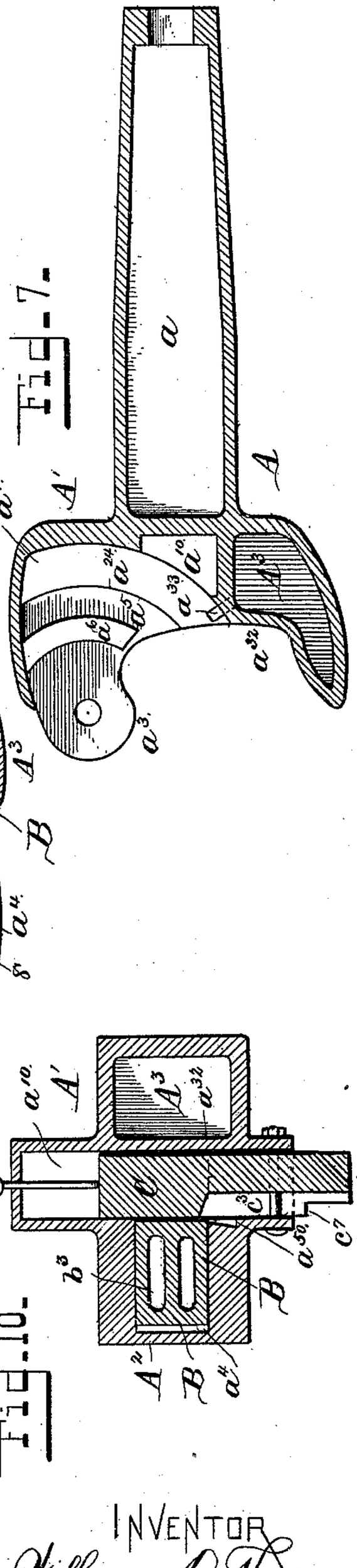

Fig. 5.

Fig. 4.

Fig. 10.

WITNESSES

J. Thomson Cross

Philip C. Rouzee

INVENTOR

William D. Thurmond

per Henry Orth Atty.

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W. D. THURMOND.

CAR COUPLING.

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Fig. 8.

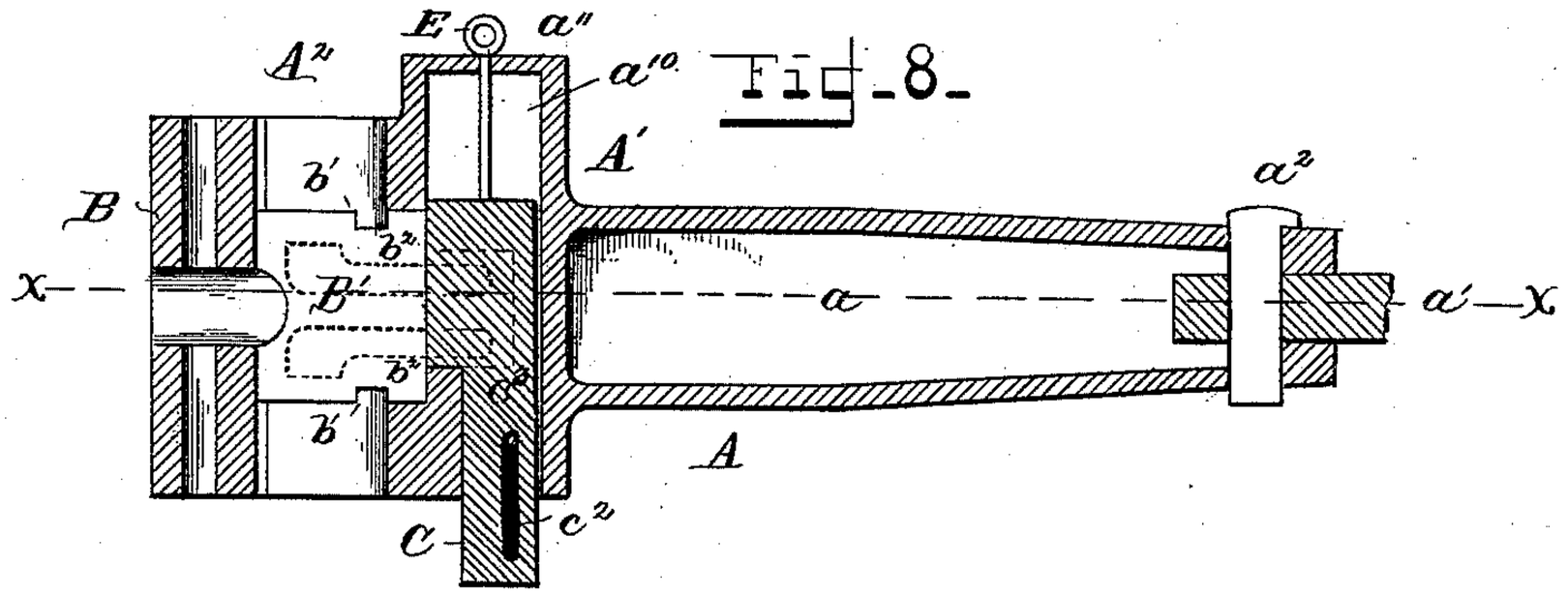


Fig. 9.

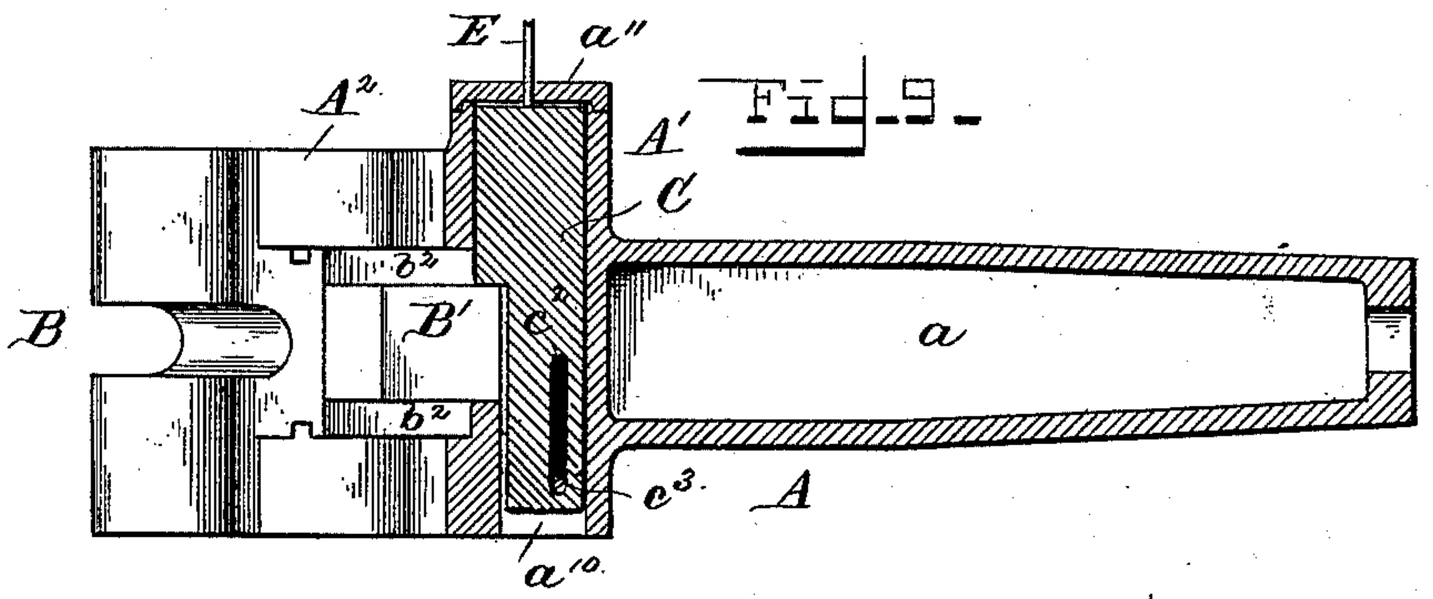


Fig. 11.

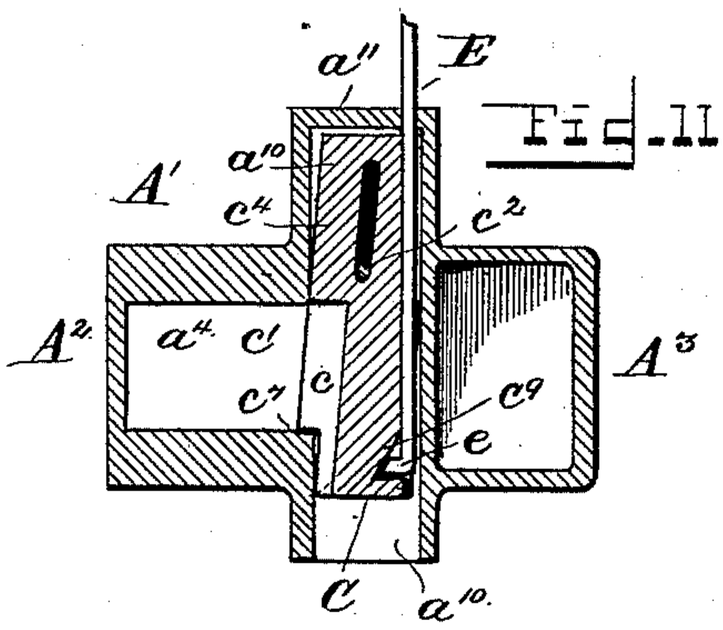


Fig. 12.

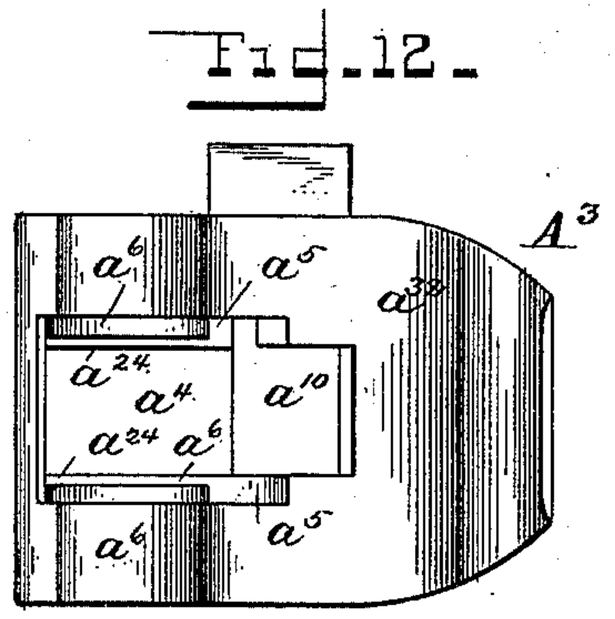
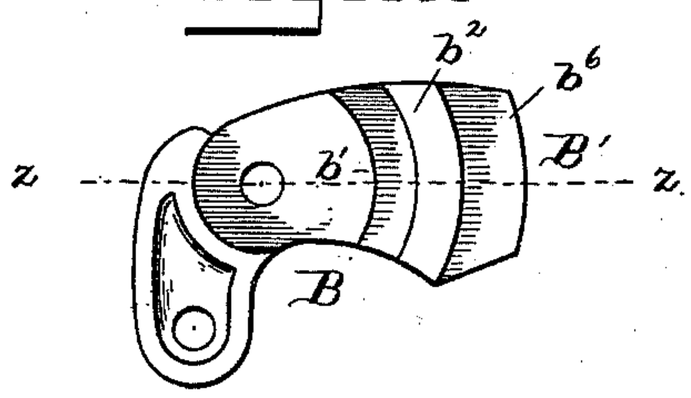


Fig. 13.



WITNESSES
J. Thomson Cross.
Wilh. E. Rouzer

INVENTOR
William D. Thurmond
per Henry Orth
Atty

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W. D. THURMOND.

CAR COUPLING.

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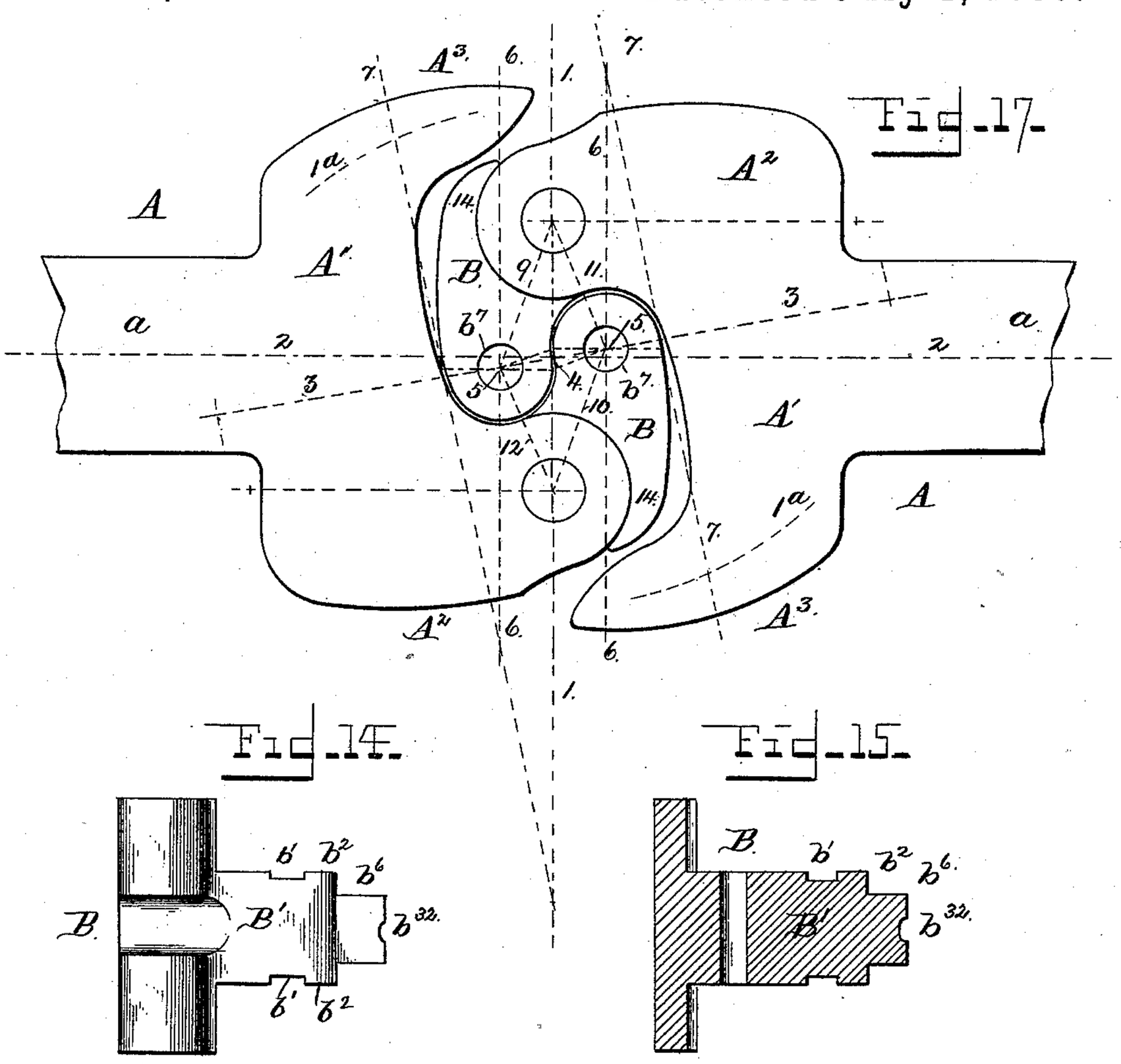
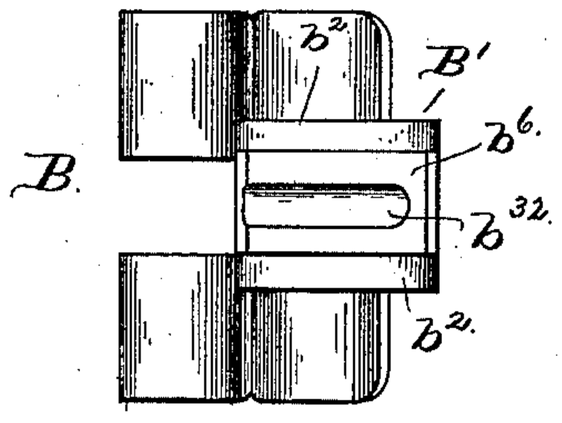


Fig. 17.

Fig. 14.

Fig. 15.

Fig. 16.



WITNESSES

J. Thomson Cross.

Wilh. E. Rouse

INVENTOR

William D. Thurmond

per Henry Orth

Atty

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W. D. THURMOND.

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Fig. 21.

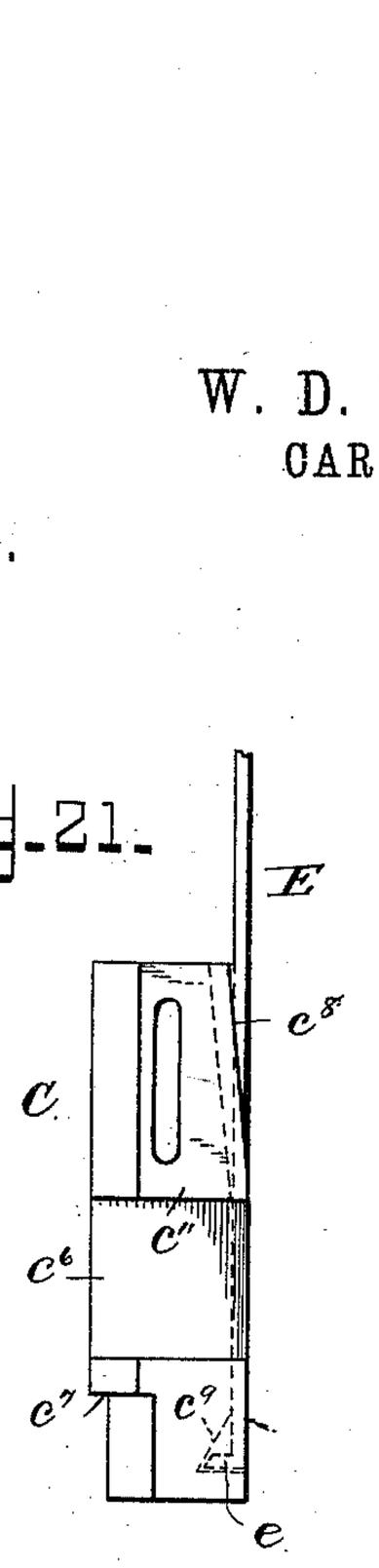


Fig. 22.

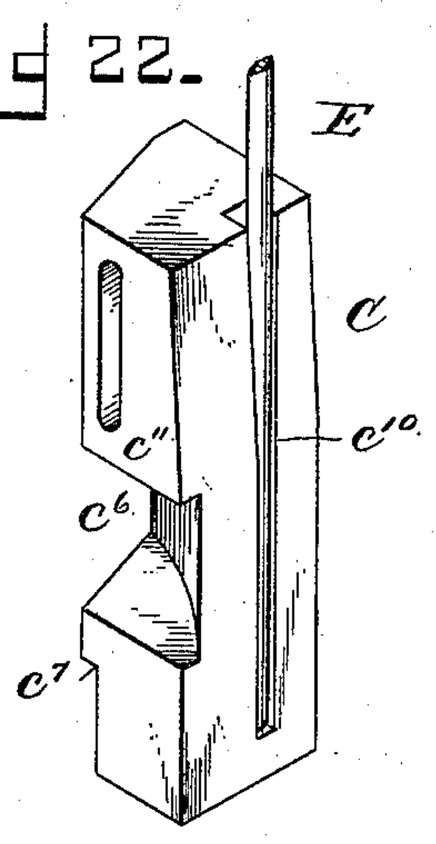
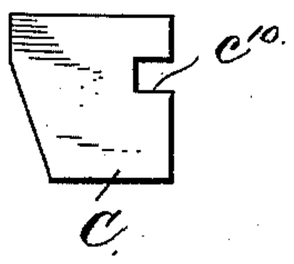


Fig. 23.

Fig. 24.



WITNESSES

J. Thomson Cross

Milt. O. Rouzee

INVENTOR

William D. Thurmond

per Henry Wh Atty

UNITED STATES PATENT OFFICE.

WILLIAM DAVID THURMOND, OF FORSYTH, GEORGIA, ASSIGNOR TO THE THURMOND CAR COUPLING COMPANY, OF WEST VIRGINIA.

CAR-COUPLING.

SPECIFICATION forming part of Letters Patent No. 431,415, dated July 1, 1890.

Application filed May 5, 1888. Serial No. 272,896. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM DAVID THURMOND, a citizen of the United States, residing at Forsyth, in the county of Munroe and State of Georgia, have invented certain new and useful Improvements in Car-Couplings; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Referring to the drawings, Figure 1 is a top plan view showing two of my improved couplers coupled together. Fig. 2 is a like view of one of the couplers, showing the coupling-hook fully swung out. Fig. 3 is an under side view of one of the couplers. Fig. 4 is a horizontal transverse section of two couplers coupled together, taken on the line *x x* of Fig. 8. Fig. 5 is a like view of one of the couplers, the hook being shown in plan. Figs. 6 and 7 are similar views of the draw-bar, a modified means for limiting the movement of the hook on its pivot-bearings being shown in the latter figure. Fig. 8 is a vertical longitudinal axial section of one of the couplers. Fig. 9 is a like view showing the locking bar or bolt in position for coupling. Fig. 10 is a section taken on line *y y* of Fig. 1, showing the hook locked by the locking-bar. Fig. 11 is a like view, the coupling-hook being removed, and illustrating modifications in the means of lifting the locking-bar and setting the same for coupling, said bar being shown in the latter position. Fig. 12 is a front elevation of the draw-head, the coupling-hook and locking-bolt being removed. Figs. 13 and 14 are a top plan view and an elevation of the coupling-hook detached. Fig. 15 is a section thereof on line *z z* of Fig. 13. Fig. 16 is a rear end view of the hook. Fig. 17 is a view similar to Fig. 1, but drawn to an enlarged scale, showing the lines of strain and draft. Figs. 18 and 19 are front and side elevations of the locking-bolt. Fig. 20 is an isometric view thereof; and Fig. 21 is an elevation of the same, showing a modified construction. Fig. 22 is an isometric view; and Figs. 23 and 24 are a rear elevation and a top plan view, respectively, of a modified form of locking-bar.

The invention relates to that class of couplers known as "automatic hook couplers;" and it has for its object to increase the efficiency and security thereof and adapt such couplers to all conditions of practical use; to increase the strength of the hook, and at the same time to reduce the weight thereof, by a proper distribution of the strain thereon; to prevent all shearing action upon the hook-pivot; to provide means for preventing the hook from being drawn out of the draw-head when two cars are coupled together and the pivot-pin should break, whether both cars are provided with my improved coupler or whether one of said cars is provided with any other style of coupler or coupling device, and, finally, to reduce the operative parts to a minimum and to simplify and cheapen the construction of the coupler.

To these ends the invention consists in structural features and in combinations of parts, substantially as hereinafter described, and as set forth in the claims.

My improved coupler consists of three parts—the draw-bar A, the draft or coupling hook B, and the locking bar or bolt C. The draw-bar A proper is cast hollow and may be connected with the car in any usual or desired manner, or as hereinafter described.

On the front end of the draw-bar A is formed the draw-head A′, that is provided with two jaws A^2 and A^3, respectively, to receive the adjacent coupler. The construction of the draw-head A′ is so chosen that the process of annealing the cast coupler may be as uniformly carried out as possible, in order to obtain a coupler of as uniform a strength as possible. The lines of curvature and the formation of the jaws are also so chosen as to offer the greatest strength with the least weight of metal.

The outer and inner vertical lateral faces of the jaw A^2 of the draw-head A′, as well as the corresponding outer face of the shank B′ of the coupling-hook B, are segments of circles having a common center on an arc of a circle 1^a, Figs. 1, 4, and 17, whose center is that of the axis of rotation of the hook, as shown in Fig. 17, so that the hook-shank will

lie snugly against the inner face of the jaw to prevent any unequal pressure or strain thereon in coupling due to the shock when two cars in motion come together and the shank of the coupling-hook is pushed with great force into the draw-head. This jaw A^2 is provided with ears a^3, between which the hook B is pivoted, as usual. The bearings or ears a^3 for the hook and pivot-pin D are of such a diameter or so located relatively to the outer lateral vertical face of the jaw A^2 as to form a vertical shoulder a^{22} at the point of junction of the ear with the jaw, which shoulder, in conjunction with a like shoulder b^{22} on opposite sides of the hook-shank, limit the movement of the hook in its outward rotation.

The jaw A^2 of the draw-head A′ is chambered or cored out, as at a^4, Fig. 12, just sufficiently to allow the hook B to swing in and out, the front vertical wall of the chamber a^4, as well as the corresponding rear face of the hook-shank, being segments of circles whose common center is the axis of rotation of the hook B, there being just sufficient space between the end of the hook and said vertical wall of the chambered portion to admit of the hook-shank moving in and out freely. In the opposite horizontal faces of the chambered jaw is formed a guide-groove a^5 on arcs of circles whose center is also the axis of rotation of the hook B, the rear vertical wall a^{24} of the groove being of greater height than the like opposite front wall, while the ears a^3, in which the hook is pivoted, are reduced in thickness, so as to form a shoulder a^6 of a curvature corresponding with the curvature of the guide-groove a^5. The jaw A^3, as shown, is cast hollow and presents a solid front wall a^{32}.

As the hook is guided in its movements in coupling and uncoupling by the guide and groove-shoulder a^5 and a^6, that also form abutments or bearings that, together with the front vertical face or wall of the chamber a^4 in the jaw A^2, take up all end-thrust upon the hook, it will readily be seen that all strain or shearing action upon the pivot-pin of the hook is absolutely avoided.

By the construction referred to a plurality of pivotal bearings are provided for the hook, so that should the pivot-pin D break or be accidentally or designedly removed the hook could not be drawn out of the draw-head so long as the tongues thereof are in the slightest degree in engagement with the groove a^5 in the draw-head. On the other hand, since the hook-shank fits snugly into the chamber of the jaw A^2, snow, ice, or dirt that may fall, form, or accumulate on the hook while drawn out or partially drawn out is sheared or scraped off when the hook-shank is pushed into the chamber of the jaw A^2, as will be readily understood. Furthermore, by the described construction of draw-head I am enabled to materially reduce the bulk of the coupling-hook B, and consequently its weight, the rear portion b^3 of the shank B′ being considerably reduced in thickness, and as said hook is fully supported in its bearings it need not be as strong as the hooks of analogous couplers as heretofore constructed, and I am enabled, therefore, to cast it hollow, thus producing a comparatively very light hook, that may be readily and uniformly annealed.

The hook B has upon its upper and lower faces a guide-shoulder b' and a tongue b^2, the former bearing against the shoulder a^6 and the latter working in the guide-groove a^5 of the draw-head, the hook being thus held against endwise motion, whatever may be the position of the hook, so long as a portion of the shank thereof remains within the draw-head. The amplitude of the rotary motion of the hook, as hereinbefore stated, is limited outwardly by the shoulder a^{22} on the draw-head, and that b^{22}, as shown in Figs. 2 and 17, so that the hook-shank can at no time swing fully out of the draw-head so long as the pivot pin or bolt D remains in position; hence any thrust upon the coupling-hook from any cause will be resisted by the several bearings for the shank, and not by the pivot-pin D, as heretofore, said pin being thus entirely relieved of all strain, which is an important improvement in this class of couplers. The outward rotation of the hook B may also be limited by a stop a^{33} in the path of the hook-shank, the latter having its rear face suitably grooved to allow the shank to swing out the required distance, the rear wall of the groove b^{32} abutting against the stop a^{33} when the hook is swung out, thus locking the hook in against farther movement, as shown in Figs. 7 and 16. The stop a^{32} is preferably a screw-pin screwed into the wall of the chamber a^4 at the proper point, so that said pin may be removed if it is desired to remove the hook, or for introducing the hook into the draw-head when a coupler is put together.

In the draw-head A′ is formed a vertical opening or chamber a^{10}, that intersects the line of draft or longitudinal axis of the coupler and the chambered portion of the draw-head, and in this opening is fitted the locking bar or bolt C, which has that side or a portion of that side which faces the shank of the coupling-hook slightly beveled off, as shown, to fully bear against the inner vertical face of the hook-shank, and instead of forming said face inclined it may be made perfectly straight, as shown in the left-hand coupler, Fig. 4, in which case the locking-bolt is square in cross-section.

The locking-bar C has an attenuated shank *c*, the front face of which is of curvilinear form, the curvilinear line being a segment of the circle in which the coupling-hook swings or a continuation of the curved front vertical wall of the chamber of the jaw A^2 and the inner vertical wall of the jaw A^3, so that when the locking-bar is lifted in uncoupling the hook can swing outward on its pivot.

In uncoupling it may happen that the lock-

ing-bar C is not lifted to the full extent to carry the square portion thereof clear of the hook, and thus prevent the uncoupling of the cars. To avoid the necessity of lifting the bar to its full extent, I bevel off the front corner c', adjacent to the shank of the bar at that side which faces the shank of the coupling-hook, so that the bar need not be lifted as high as it would have to be lifted without this beveled-off corner, as more plainly shown in Figs. 18 and 20. The shank c of the bar C is slotted transversely and through said slots c^2 passes a pin c^3, that has its bearings in the under side of the draw-head and that serves to limit the vertical movements of the bar, as shown in Fig. 3.

Instead of transversely slotting the shank of the bar C, the bar itself may be grooved or slotted vertically on a line at right angles to the slots c^2, as shown at c^4 in dotted lines, Figs. 18 and 20, and in full lines in Fig. 21, and a pin projecting into the groove or slot made to limit the movement of said bar.

To prevent snow or dirt entering into the opening a^{10} or ice forming therein, and thereby render the locking-bar inoperative, the opening may be closed by a cap or cover a^{11}, hinged or otherwise connected with the draw-head to close the upper end of the opening a^{10} and admit of the bar being inserted through the upper end of the slot or opening a^{10}.

When the locking bolt or bar C is constructed as shown in Figs. 18, 19, and 20, the vertical opening a^{10} or chamber has in cross-section the form or substantially the form of the locking-bar C and its shank, as shown in Figs. 1 and 3. The cap of the chamber a^{10} may, however, form an integral part of the draw-head A', in which case the locking-bar C is introduced into the chamber a^{10} from below, said chamber being then of substantially rectangular form in cross-section, and the locking-bar C may then be constructed as shown in Figs. 22, 23, and 24, or substantially square at both ends with an intervening cut-away portion c^6 to allow the shank of the coupling-hook to swing out when the bar C is positioned for uncoupling.

Any suitable means may be employed for manipulating the locking-bar from the side or from the top of the cars or from the platform thereof in uncoupling, and the lifting devices may be connected to the bar proper or to its shank, or they may be arranged to operate on said shank. As shown in Figs. 8, 9, 10, 18, 19, and 20, the bar has a rod E screwed thereto, that extends through the cap or roof of the opening or chamber a^{10} for lifting the bar by means of a cord, chain, or a lever and proper connections. A vertical groove c^{10} may be formed in the side of the locking-bar, extending nearly to the lower end thereof, as shown in Figs. 21, 22, and 23, and the lifter-rod E may have its lower end bent at right angles, said bent portion taking into a recess or socket at right angles to the groove c^{10} at the lower end thereof, so that the bar C may be lifted by the rod E. In either of the arrangements described the locking-bar will set upon the hook-shank—that is to say, when the bar is lifted in uncoupling and the hook swings out a portion of the hook-shank will remain within the draw-head, so that when the locking-bar is released the shoulder c^{11}, formed by the attenuated shank c of the bar, will rest on the shank of the coupling-hook.

If desired, the locking-bar when lifted in uncoupling may be automatically set for coupling by causing it to rest on the lower inner face of the draw-head, instead of resting on the hook-shank or on a shoulder a^{50}, formed in the face of the opening a^{10}, whether the locking-bar C is constructed as shown in Figs. 18, 19, 20, and 21 or as shown in Figs. 22, 23, and 24, by cutting away the front corner on that side of the bar which faces the hook-shank to form a shoulder c^7, as shown in Fig. 11. Inasmuch as a lateral movement toward the shank has to be imparted to the locking-bar to carry the shoulder c^7 over the lower inner face of the chamber in the draw-head or upon the shoulder or offset a^{50}, the upper outer lateral face of the bar C is slightly beveled, as shown at c^8, Fig. 21, and the horizontal portion e of the lifting-rod E has an inclined or beveled outer face that works on an inclined face of the recess c^9, merging into the groove c^{10}, Figs. 11, 21, and 22, in which the lifting-rod lies. It is obvious that when said rod is pulled up the locking-bar will move with it until the lower edge thereof has closed the inner edge of the opening in the floor of the chamber a^4 or the shoulder a^{50}, when said bar will be moved laterally or toward the shank of the coupling-hook, so as to rest upon said inner face or floor of said chamber or shoulder a^{50}, as the case may be, ready for coupling.

The coupler may be secured to the car by a draft-pin a', slotted to receive a key a^2, as shown on the right of Fig. 4 and in Fig. 8, the draw-bar a being correspondingly slotted; or said coupler may be connected to the car by a headed draft-pin a', as shown in Fig. 5, in which case the wall a^4, intervening between the draw-head and draw-bar, will be provided with an opening to insert the draft-pin from in front of the coupler. To this end the locking-bar must be removed; but this can be avoided by forming a suitable opening c^6 in the shank of the said bar, as shown in Fig. 18.

The coupler may be used as a link-and-pin coupler, the nose or hook portion of the coupling-hook being forked to receive the link and perforated to receive the pin; or the hook may be removed and the link coupled to the ears a^3 of the draw-head.

From an inspection of Fig. 17 it will be seen that the pivotal axis of the coupling-hook B lies in a plane 1, that passes between the inner vertical faces of the coupled hooks and forms four right angles with the line of draft 2, said plane 1 being tangential to the circle, a segment of which bounds the nose of

the hooks, said circle having for its center the axis of the perforation b^7 for the link-pin. This location of the hook-pivots is of importance, as it gives a thickness of one and one-eighth inch of metal to protect the ears or bearings of the draw-head, as shown at 14. In addition to this, it relieves the pin from all shearing strain exerted on a line 3, whether the additional pivotal bearings a^5 a^6 are employed or not, which shearing strain has been a serious objection to this class of couplers as heretofore constructed.

There is still another very important feature involved in my improved coupler, in that the pivot-pin of the coupling-hooks may be removed without impairing the function of the coupler, as it is an impossibility, in view of the described construction and relative arrangement of the hook and draw-head, for said hook to pull out of the latter when two cars are coupled together, whether one or both cars are provided with my improved coupler, and whether the limiting abutments a^{22} b^{22} are used or not. It will be seen that were the abutments a^{22} and b^{22} or the described equivalents thereof absent and the pivot-pin for the hooks removed after two cars are coupled together, and the coupling-hooks locked by the locking bar or bolt, an uncoupling would be impossible until the locking-bar is lifted to allow either coupling-hook to swing out, the removal of the pivot D simply shifting the axis of rotation of the hooks from said pins to the tongue-and-groove bearings of the hook and draw-head.

There is still another advantage in limiting the outward movement of the coupling-hook so that a portion of the hook-shank will at all times lie in the plane of motion of the locking-bar, in that no inclines are necessary, either on the hook-shank or locking-bar, to lift the latter in coupling, such inclines being a source of annoyance, as the operation of the locking-bar is very often defeated, force being required to drive the shank of the coupling-hook inward to lift the locking-bar. This is obviated, since the locking-bar, when lifted to the proper height, will rest upon the shank of the coupling-hook the moment the latter commences to move outwardly. On the other hand, these inclines wear so rapidly as to render the locking devices inoperative in a comparatively short time, and also tend to weaken either the hook-shank or the locking-bar.

As shown in Fig. 17, the centers 5 of the hooks proper lie in a plane 3, that intersects the line of draft 2 at the point 4, where the line of draft 2 is intersected by the plane 1, in which lie the axes of rotation of the hooks.

It will be seen in Fig. 17 that the centers 5 of the hooks form with the axes of rotation of the hooks a geometrical figure having two equal sides 9 and 10 and two equal sides 11 and 12 shorter than the sides 9 and 10 on opposite sides of the line of draft and having two of its angles in a plane at right angles to said line of draft and two of its angles on opposite sides and equidistant from said line of draft, so that the strain upon the hooks is equally divided and transferred to the shanks thereof. The line 6 is also a perpendicular to the line of draft 2, while the line 7 forms an angle of about ten degrees with said line of draft, which angle coincides with those formed by the said line of draft and the line 3 drawn through the centers 5 of the hooks, while if the line 7 and the line 1, or any perpendicular to the line of draft, are produced they also will form an angle of ten degrees. I find that by locating the centers of the hooks and their axes of rotation relatively to each other as above set forth the strain on the hooks is more evenly distributed than by any other construction, while at the same time sufficient room is provided to admit of coupling on all existing track-curves. Besides this, there is sufficient play allowed to the shank of the coupling-hook within the draw-head, as shown at 8, Fig. 4, to allow the front faces of the hooks to come in contact with the like face of the head of the draw-bar, thus taking all the strain off the noses or points of the hooks.

From an inspection of Figs. 1 and 17 it will be seen that the inner face of the draw-head and its jaw are so constructed as to conform exactly to the outer faces of the hooks and their bearings, so that when two couplers come together the thrust will be taken up by the said faces and distributed equally over the entire coupler, thus relieving any part thereof from undue strain.

Having thus described my invention, what I claim is—

1. In a hook-coupler, the combination of a coupling-hook and a draw-head provided with a plurality of pivot-bearings for said hook and in combination therewith, of a locking-bar having a motion at right angles to the hook-shanks, substantially as and for the purposes specified.

2. In a hook-coupler, the combination of a coupling-hook and a draw-head provided with a plurality of pivot-bearings for said hook, one of said pivot-bearings D being arranged in the plane of the inner or engaging face of the hook, substantially as and for the purposes specified.

3. In a hook-coupler, the combination of a coupling-hook and a draw-head provided with a pivot-bearing D and one or more pivot-bearings formed on arcs of circles drawn from the center of said bearing D, substantially as and for the purposes specified.

4. In a hook-coupler, the combination of a coupling-hook and a draw-head provided with a plurality of pivotal bearings for said hook, whereby the function of the hook is not impaired should one of the bearings give way, substantially as and for the purposes specified.

5. In a hook-coupler, the combination of a coupling-hook and draw-head provided with a plurality of pivotal-bearings for said hook

and a stop to limit the rotation of the hook on said bearings, substantially as and for the purposes specified.

6. In a hook-coupler, the combination of a coupling-hook and a chambered draw-head for the reception of the hook-shank, said parts being provided with a plurality of bearings connecting them pivotally together, and a stop to limit the rotation of the hook on said bearings and prevent its swinging completely out of its chamber, whereby said hook cannot be withdrawn from the draw-head should one of the bearings give way, substantially as and for the purposes specified.

7. In a hook-coupler, the combination of a coupling-hook provided with a pivot-bearing and a shoulder b' and tongue b^2 on the shank thereof, and forming segmental bearings, said segments being arcs of circles the center of which is that of the pivot-bearing, and a draw-head provided with a chamber for the reception of the shank of the hook, also with pivot-bearings a^3, a groove a^5, and shoulder a^6 in the opposite faces thereof, and co-operating with the bearing-shoulder and tongue of the hook, substantially as and for the purposes specified.

8. In a hook-coupler, the combination, with a coupling-hook provided with a pivot-bearing and a shoulder b' and tongue b^2 on the shank thereof, forming segmental bearings, said segments being arcs of circles the center of which is that of the pivot-bearing, a draw-head provided with a chamber for the reception of the shank of the hook, also with pivot-bearings, a groove a^5, and shoulder a^6 in the opposite faces thereof and co-operating with the bearing-shoulder and tongue of the hook, of a stop to limit the rotation of the hook and a locking bolt or bar provided with an attenuated shank and movable in a plane at right angles to the plane of motion of the hook, substantially as and for the purposes specified.

9. In a hook-coupler, the combination, with the draw-head and the coupling-hook pivoted thereto, of a locking-bar C, provided with a segmental shank c, constructed to form the shoulder c'', provided with the beveled or inclined portion c', the shoulder c^7, the vertical groove c^{10}, and inclined recess c^9, and the lifting-rod E, provided with the beveled arm e, substantially as and for the purposes specified.

10. In a hook-coupler, the combination, with the draw-bar and draw-head provided with an opening in the wall intervening between the two, of the locking-bar C, provided with an opening or perforation in the shank c thereof, substantially as and for the purposes specified.

11. The combination of the draw-head provided with circular flangles on its front end, with a knuckle or coupling-head provided with corresponding grooves to receive the flanges, and which flanges and grooves are made to receive the buffing and drawing strain, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM DAVID THURMOND.

Witnesses:

W. B. BROWNING,

S. B. HEAD.