Nov. 1, 1932. J. A. SHAFER 1,885,145

BOX CAR DOOR

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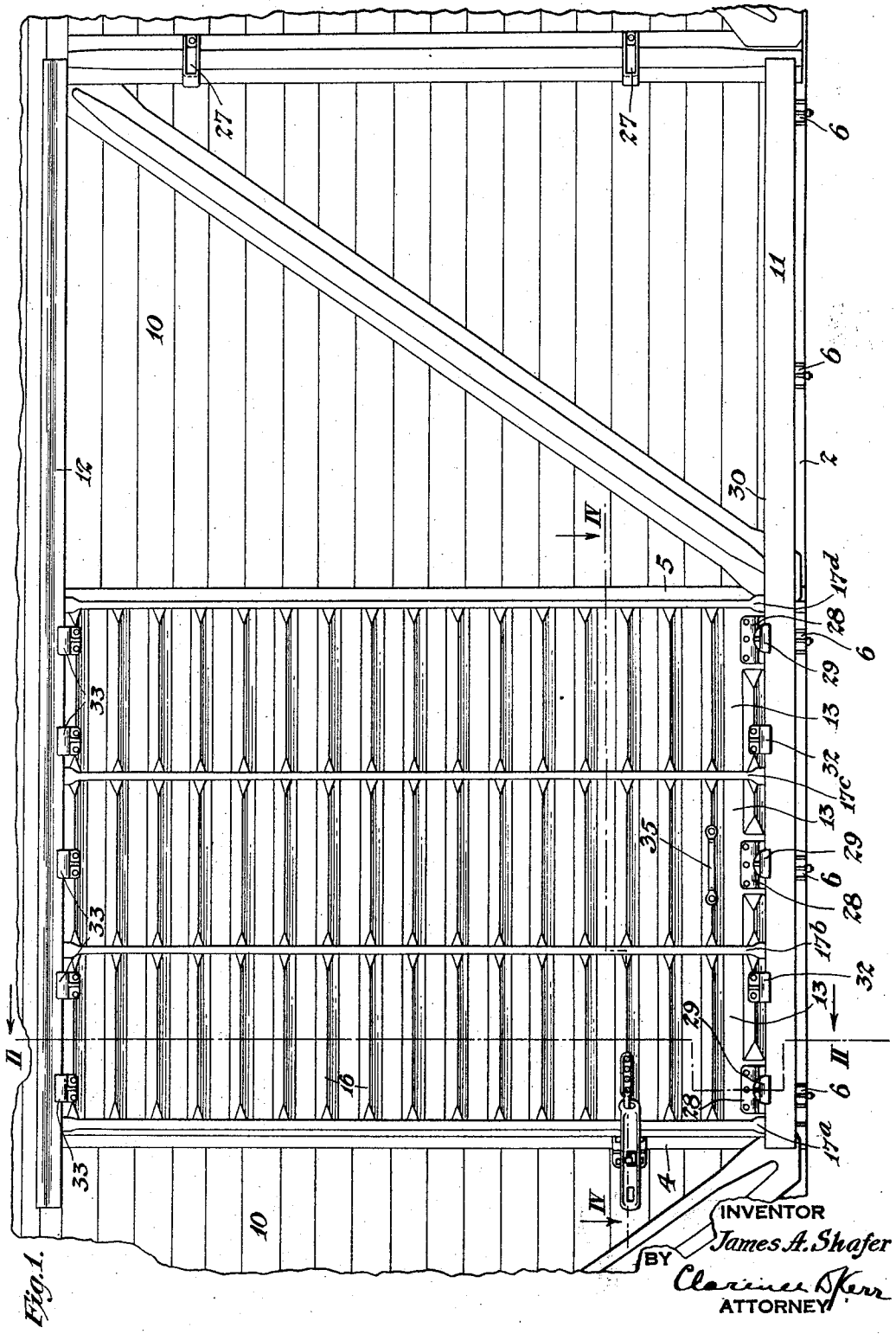


Fig. 1.

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Fig. 2.

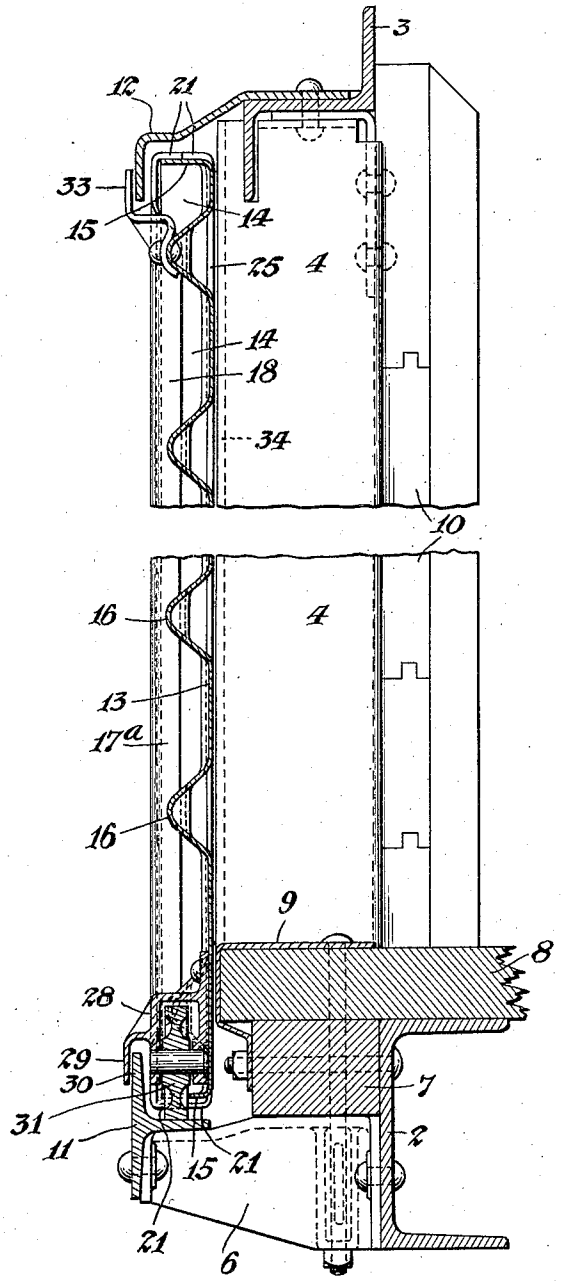
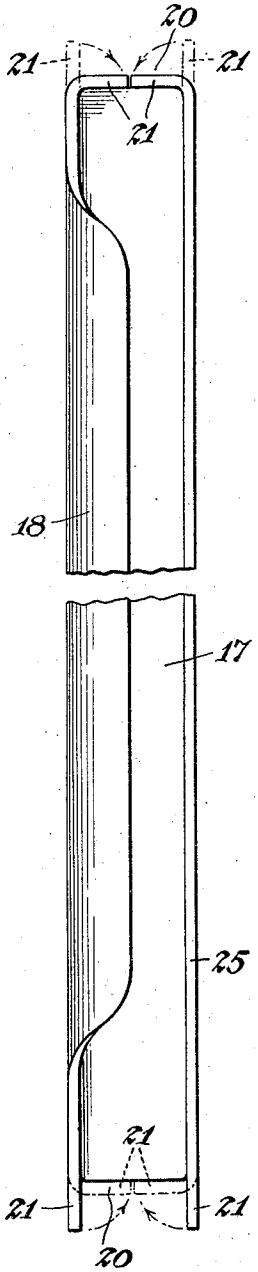


Fig. 3.



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Fig. 4.

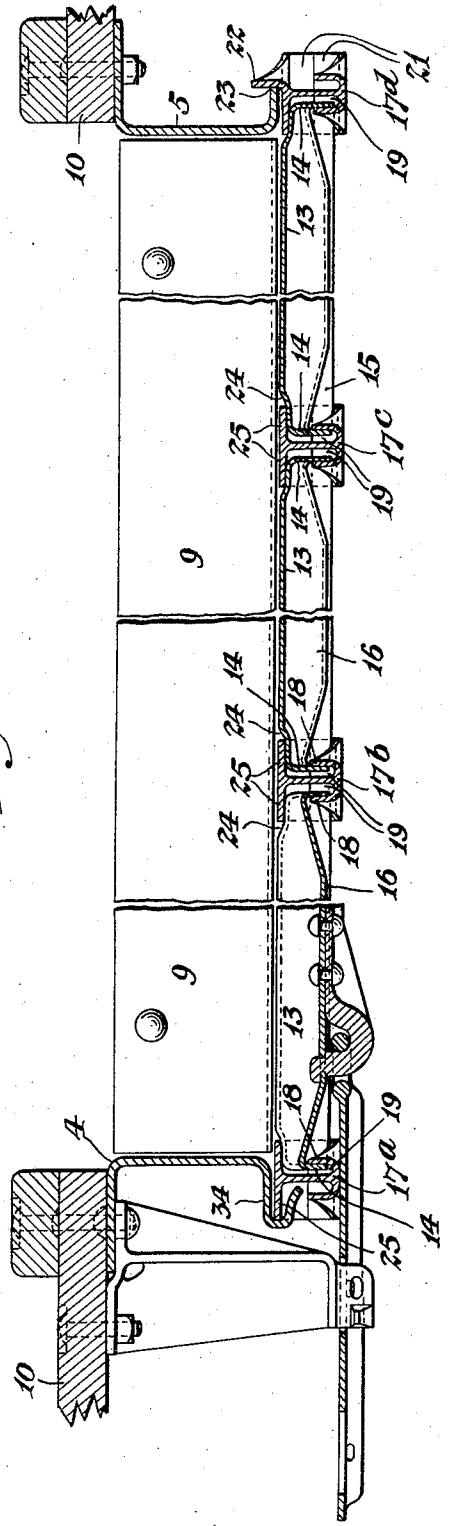
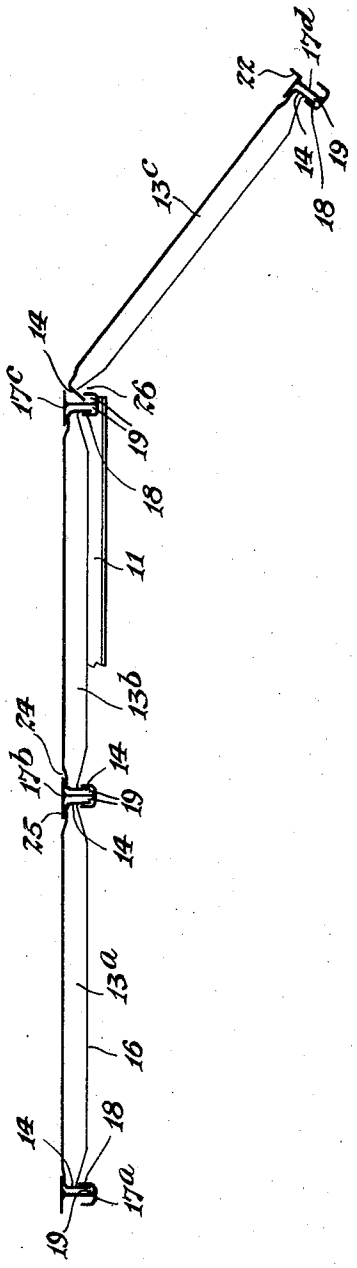


Fig. 5.



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UNITED STATES PATENT OFFICE

JAMES A. SHAFER, OF EAST CLEVELAND, OHIO, ASSIGNOR TO NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

BOX CAR DOOR

Application filed October 30, 1928. Serial No. 315,981.

My invention relates to box car doors made of steel or other metal, and comprises a door made up of a plurality of panel sections, coupled together and supported in position by means hereinafter described. My invention also comprises other features hereinafter described and claimed.

Fig. 1 is a front elevation of my improved freight car door, as applied to the standard single-sheathed box car in common use; Fig. 2 is a vertical section along line II—II of Fig. 1; Fig. 3 is a side elevation of the vertical coupling member by means of which two adjacent panels of the door are coupled together; Fig. 4 is a horizontal section along line IV—IV of Fig. 1; Fig. 5 is a diagrammatic view illustrating the assembly of the door upon the car.

Referring more particularly to the drawings, these show the side sill 2, the Z-bar side plate 3, the forward door post 4 and the rear door post 5. The door track brackets 6 are supported from the side sills 2 immediately below the door opening support 7. A portion of the car flooring is shown at 8, and the threshold plate at 9. A portion of the siding is indicated at 10. All of the foregoing are parts of the usual box car construction.

The door track 11 and top hood 12 are preferably of the special construction hereinafter more fully explained.

The body of my improved door consists preferably of three horizontally corrugated sheet steel panels 13, which may be pressed or otherwise formed from metal. The panels 13 are formed with outwardly extending marginal flanges on all four edges, the vertical flanges being indicated at 14 and the horizontal flanges at 15. The corrugations 16 of the panels 13 slope inwardly at their ends, towards the vertical side flanges 14 of the panels as is best shown in Fig. 4, in order to provide clearance for the vertical coupling members 17 (*a*, *b*, *c*, and *d*). Each of these coupling members 17, as is shown in Fig. 3, consists of a rolled H section with one flange 18 turned over to form inwardly directed pockets 19 for engagement with the side flanges 14 of the panels. At each end of the coupling member 17 the web is coped out, as is indicated at 20 in Fig. 3, so that the ends of the flanges 21 may be turned over to form the end walls of the coupling member 17.

All of the vertical coupling members 17 are preferably of the same form, except the one 17*d* at the rear of the door, which has an edge 22 of its inner flange turned over for engagement with the edge 23 of the rear door post 5. The panels 13, adjacent the vertical flanges 14 are preferably offset, as at 24, in order that the inner flanges 25 of the coupling members 17 may overlap the door panels 13 without projecting inwardly farther than the inner surface of the panels. This construction prevents any interference, by the car lading, with the opening of the door.

The way in which the door is assembled on a car is indicated diagrammatically in Fig. 5 which shows a portion of the door track 11. Three of the coupling members 17 (*a*, *b*, and *c*) and two of the panels 13 (*a*, and *b*) have been mounted on the track, and the remaining panel 13*c* and coupling member 17*d* have been assembled and are about to be connected as at 26 to that portion of the door already in place. The connection is made by placing the panel 13*c* in the position shown and rotating it in a counter-clockwise direction until it is in the same plane with the previously assembled portion. The whole structure may then be rolled along the door track to its final position. The back stops 27, best shown in Fig. 1, are then attached to the car, and the panels, being maintained in line with each other by the door track and hood, thereafter cannot be displaced.

The roller housings 28 have integral guide flanges 29, formed on their outer sides which overlap the upper flange 30 of the T-shaped door track 11, which I prefer to use, as it effectively prevents outward displacement of the door.

My improved door may be mounted on the car by any of the known means of support, but for purposes of illustration, I have shown a "bottom supported" door with three rollers 31, one under each panel. The rollers 31, under the end panels 13, are placed near the

outer ends thereof, while that under the middle panel is placed at the center of the panel. Near the inner ends of the two end panels are mounted guide brackets 32, which, in addition to the guide flanges 29, engage the upper flange 30 of the door track. The top guide brackets 33 are attached to the upper ends of the panels, and engage the top hood 12, as is shown in Fig. 2, which serves to prevent displacement of the door.

The forward door post 4, as is shown in Fig. 4, is formed with its outer flange 34 turned over so as to engage the forwardly extending portion of the inner flange 25 of the forward coupling member 17*a* when the door is closed, thus providing additional support against outward displacement.

The sectional construction of my improved door, since each of the several panels is free to assume a slight angularity with regard to the others, as well as to have a slight vertical displacement, gives it a very desirable flexibility. Thus, if the door track becomes bent or damaged, it will not interfere with the movements of the door. Another advantage is that the door may be assembled and placed on the car by one man, each panel being light enough to be handled conveniently.

A further advantage is that my improved structure is highly resistant to bending stress, since the panels, being of small dimension in the direction of the corrugations, are therefore stronger individually, and the vertical coupling members, by reinforcing the panels vertically serve to make the structure as a whole very strong and stiff, with a minimum of weight.

Further, as all of the parts may be easily rolled or pressed, and no rivets are used in assembling the door, it may be manufactured with little difficulty and at a low cost. When rivets are used in assembling a steel door, it is usually necessary that they be countersunk which makes them difficult to drive. The countersinking of the rivet holes is a costly operation. These considerations make the elimination of rivets particularly desirable.

An additional advantage lies in the ease with which a damaged portion of my improved door may be replaced, since one man can remove and replace the damaged section without the necessity of removing or replacing the whole door or cutting out any rivets.

If desired, the door handle 35 shown on the center panel section may be left off as the vertical coupling members 17 provide adequate handholds for opening and closing the door.

The terms and expressions which I have employed are used as terms of description and not of limitation, and I have no intention, in the use of such terms and expressions, of excluding any mechanical equivalents of the features shown and described, or portions thereof, but recognize that various structural modifications are possible within the scope of the invention claimed.

What I claim is:

1. A door structure comprising a plurality of panels formed with flanges extending lengthwise thereof and projecting perpendicularly to the panel surface, and coupling means for engaging the flanges of adjacent panels and forming a flexible connection therebetween, said coupling means and flanges providing for assembly of the door by rotary movement of the panels with respect to each other.

2. A door structure comprising a plurality of panels, said panels being flanged along their adjacent edges, coupling means engaging the flanges for forming flexible connections between adjacent panels and also engaging the outer faces of said panels, rollers disposed beneath each of said panels, in combination with a track upon which said rollers are adapted to run.

3. A door structure comprising a plurality of panels, means for forming detachable connections between adjacent panels, said means overlapping adjacent edges of said panels throughout their length, a roller disposed beneath each of said panels, in combination with a track upon which said rollers may be moved longitudinally, and guide brackets mounted upon said panels for maintaining the rollers in engagement with said track, said connecting means having portions engaging said panels to limit relative longitudinal displacement of the panels and connecting means when the parts are assembled.

4. A door structure comprising a plurality of panel sections and coupling means for forming connections therebetween, said coupling means consisting of a length of H-beam with both edges of one of its flanges turned inward toward the opposite flange, so as to engage flanges formed on the members to be coupled.

5. A door structure comprising a plurality of panel sections and coupling means for forming secure but flexible connections therebetween, said coupling means consisting of a length of H-beam with both edges of one of its flanges turned inward toward the opposite flange, so as to engage flanges formed on the members to be coupled.

6. A door structure comprising a plurality of panels, and a coupling member cooperating with adjacent panels for forming a flexible connection therebetween, the parts being so constructed and arranged as to enable said panels to be rotated into interlocked relation to said coupling member.

7. A door for a railway car, comprising a plurality of panels and means for flexibly coupling said panels, said coupling means being adapted to the consecutive mounting of said panels on the car by a rotary movement.

8. The method of mounting doors on rail-

way cars, consisting of consecutively mounting on the car structure a plurality of panels and coupling members, each panel or coupling member being rotated, as it is mounted, into locked engagement with the preceding coupling member or panel on the car, and thereafter being moved bodily relative to the car for maintaining said panel or coupling member in alignment with the preceding coupling member or panel.

9. In a method of mounting doors on railway cars, the combination of steps consisting of consecutively mounting on the car a plurality of panels and coupling members and rotating each panel or coupling member, as it is mounted, into engagement with the preceding coupling member or panel on the car.

10. A door structure comprising a plurality of vertical panel sections, and coupling means separate from said panels for uniting adjacent panels and providing for relative bodily movement of the panels laterally toward and from each other.

11. A door structure comprising a plurality of panels formed with flanges thereon, each flange extending entirely in a plane at an angle to the panel surface, coupling means engaging said flanges and providing for relative angular movement between adjacent panels and for movement of translation of each panel relative to the other, and means guiding said panels for horizontal movement.

12. In a door structure, a panel coupling member having pockets, and panels each having a flange extending in and substantially confined to a single plane at an angle to the respective panel and engageable with a respective one of said pockets, said pockets providing for relative bodily movement of each panel toward and from the other.

13. A door structure comprising a plurality of panels having flanges at either end, means for flexibly connecting said panels, said means consisting of a member having a plurality of flanges, one of the flanges of said member extending between adjacent panels and preventing movement of said panels into engagement with each other, other flanges on said member cooperating with the flanges on the panels to form a secure but flexible connection therebetween.

14. A horizontally movable car door comprising a plurality of panels, means flexibly and removably connecting said panels whereby they may be rotatably disconnected when removed from said car, and guide means on said car at the top and bottom edges of said door for maintaining said panels and connecting means in assembled relation.

15. A door structure comprising a series of panels, the adjacent lateral edges of which are bent substantially at right angles to the plane of said panel, connecting members between said panels, said connecting members having flanges extending around said panel flanges, and also having flanges engaging the side of the panel opposite said panel flanges to maintain said panels and connecting members in operative relation.

16. A door structure comprising a plurality of panels, means for connecting said panels, said means having flanges on each side of said door cooperating with flanges on the panels, the flanges on one side of the connecting means forming an interlocking connection between adjacent panels, the other flanges on said connecting means serving to maintain said interlocking connection.

17. A take-down door structure comprising a plurality of panel sections formed with flanges thereon and disconnectable means for engaging the flanges of adjacent panels, said disconnectable means comprising an element having an intermediate web and flanges on opposite sides of said web whereby there are provided pockets for receiving the respective flanges of adjacent panels, said web extending between said flanges of adjacent panels, and said pockets providing for bodily movement of said panels transversely of the longitudinal axis of said element.

18. A door structure, comprising a plurality of panels formed with flanges extending lengthwise thereof, and coupling means interposed between the flanges of adjacent panels and separating the latter for forming a flexible connection therebetween, said coupling means and flanges providing for assembly of the door by rotary movement of the panels with respect to each other.

19. A door structure, comprising a plurality of panels adapted to be rotated into a flexibly locked position, and means for maintaining said panels in such position and enabling said panels to move bodily toward and from each other while in said position, said coupling means having positions thereon limiting relative longitudinal movement of the panels.

20. A door for a railway car, comprising a plurality of panels and means for flexibly coupling said panels and precluding separation of adjacent panels laterally beyond predetermined limits in response to a pull on one of said panels, said coupling means being adapted to the consecutive mounting of said panels on the car by a rotary movement, said coupling means providing for the mounting of a panel therein without disturbing the position of an adjacent panel in said coupling means.

21. A horizontally movable car door comprising a plurality of panels, means flexibly and removably connecting said panels whereby they may be rotatably disconnected when removed from said car, and guide means on said car at the top and bottom edges of said door for maintaining said panels and con-

necting means in assembled relation, said connecting means providing for movement of translation of each panel toward and from the other.

22. A door structure comprising a plurality of panels formed with flanges extending lengthwise thereof and projecting at an angle to the panel surface, and coupling means for engaging the flanges of adjacent panels and forming a flexible connection therebetween, said coupling means and flanges being constructed so as to provide for unobstructed assembly of a panel and coupling means by a rotary movement.

23. A door for a railway car, comprising a plurality of panels and means for flexibly coupling said panels, said coupling means being adapted to the consecutive mounting of said panels on the car by a rotary movement, said coupling means having portions formed thereon limiting relative longitudinal movement of the panels.

In testimony whereof, I have signed my name to this specification this 26th day of October, 1928.

JAMES A. SHAFER.