C. A. LINDSTRÖM.

TANK CAR.

APPLICATION FILED JAN. 7, 1909.

935,210.

Patented Sept. 28, 1909.

6 SHEETS—SHEET 1.

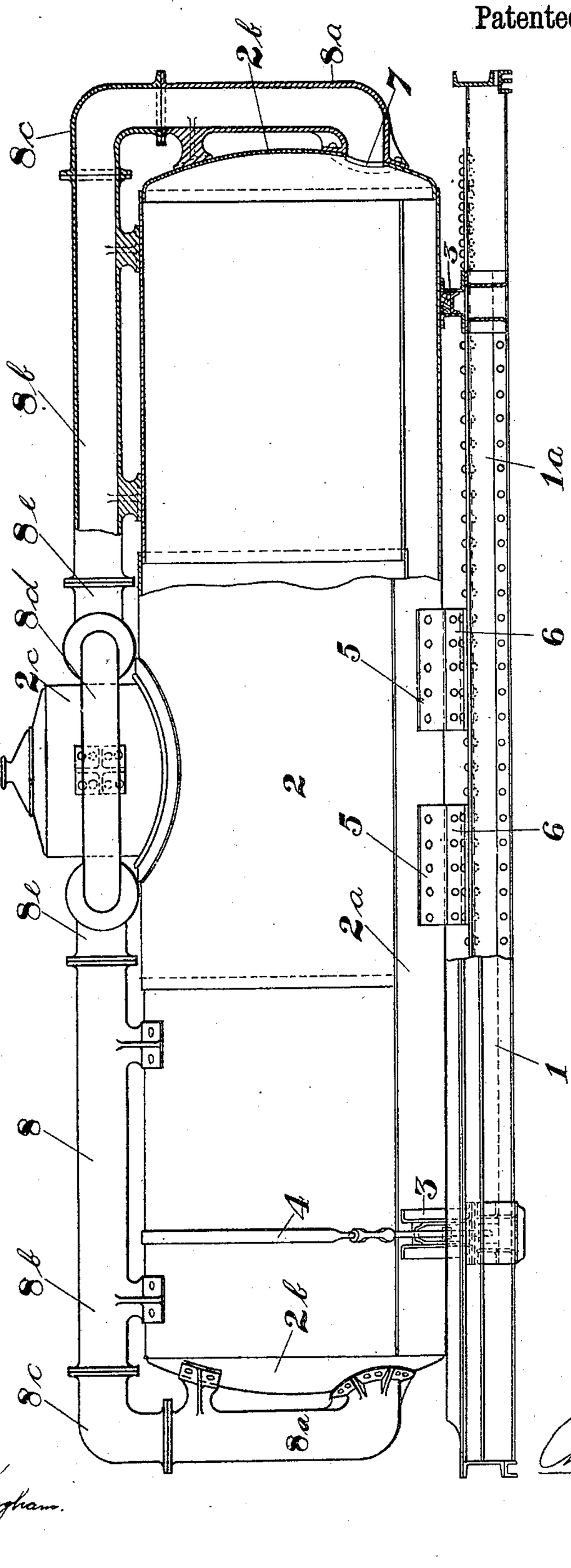

Fig. 1.

Witnesses

Frank E. Miller.

Harry Cunningham.

Inventor

Charles A. Lindström.

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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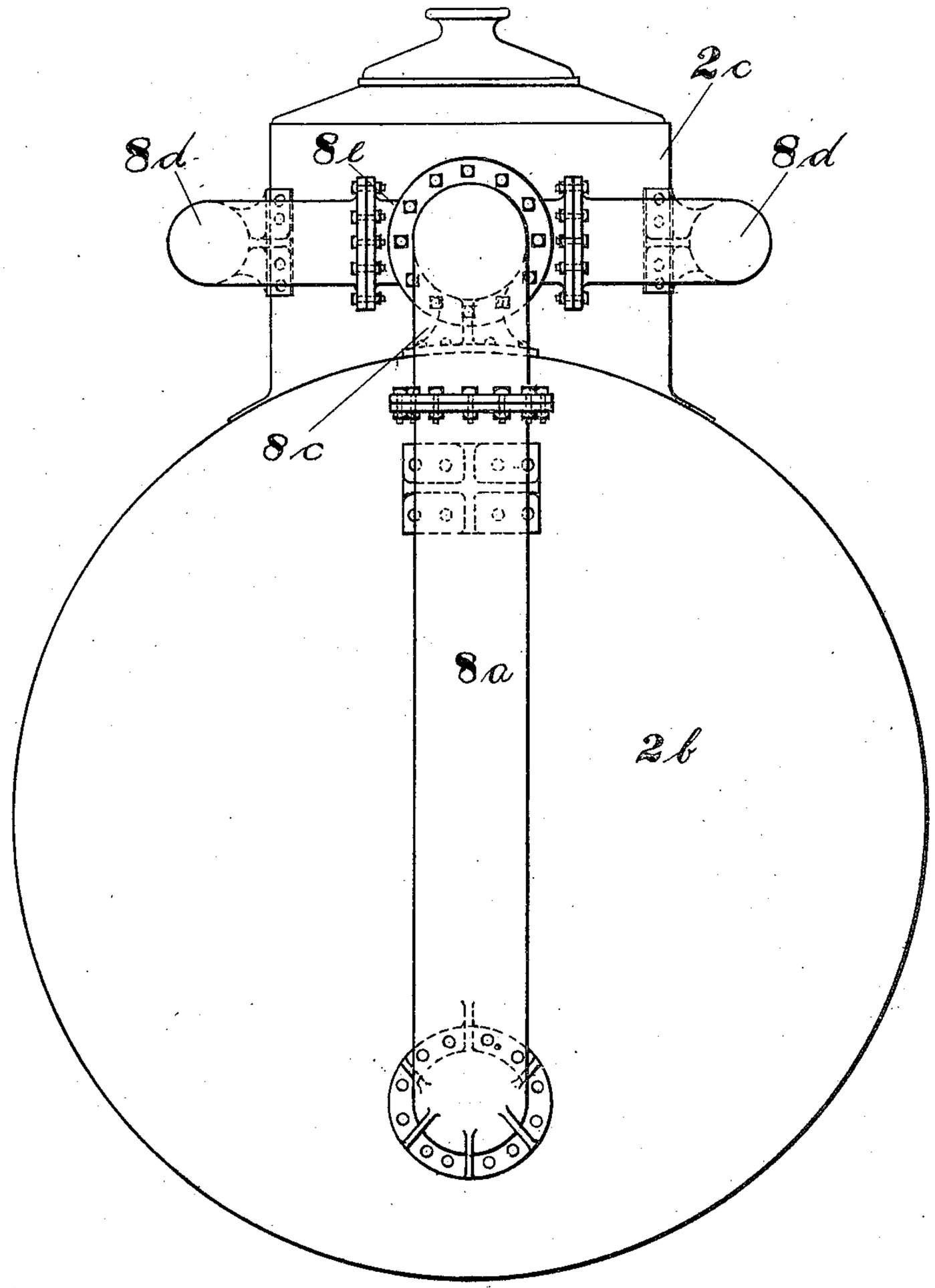

Fig. 2.

Witnesses
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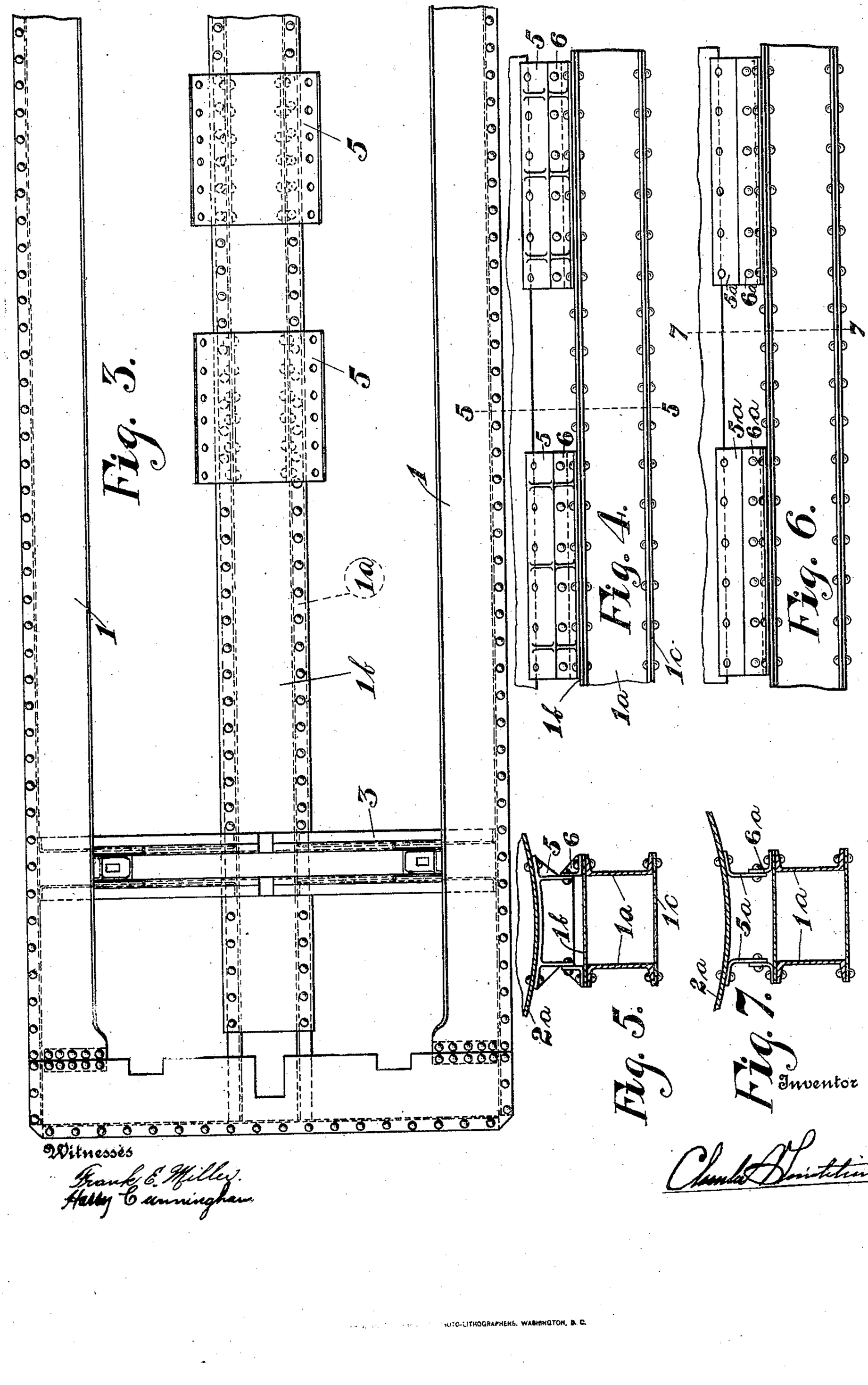

Fig. 3.

Fig. 4.

Fig. 6.

Fig. 5.

Fig. 7.

Witnesses

Frank E. Miller.

Holley Cunningham

Inventor

Clarence Lindström

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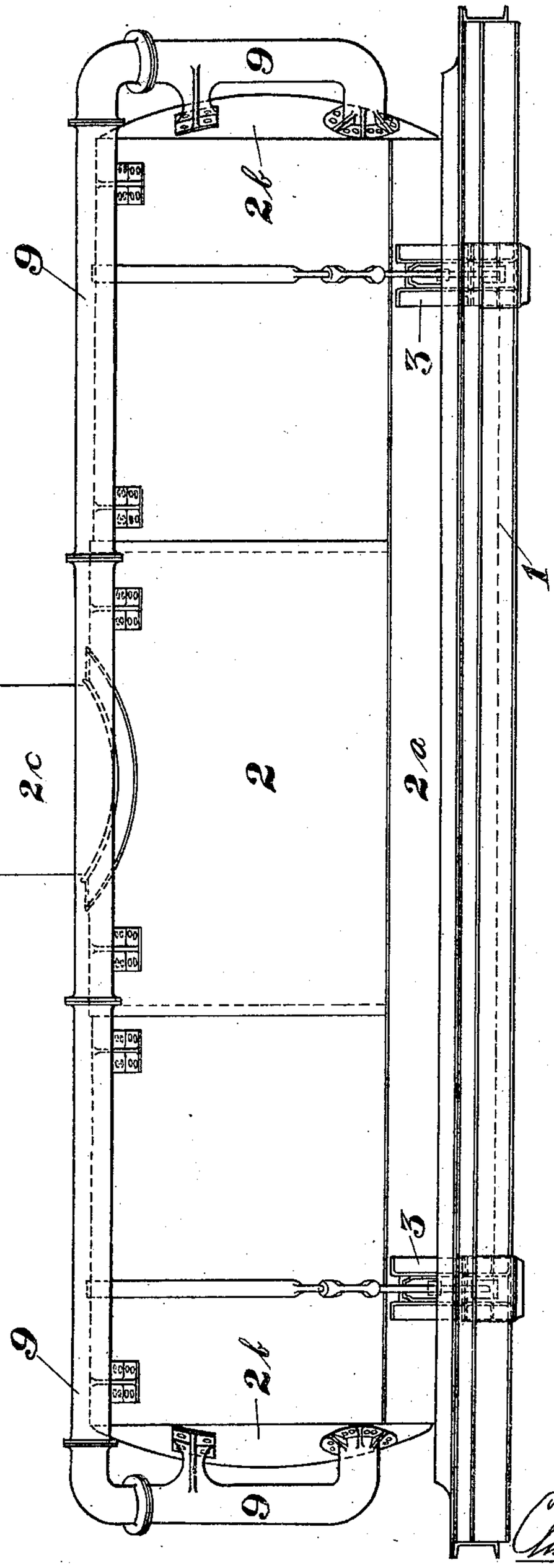

Fig. 8.

Witnesses
Frank E. Miller.
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6 SHEETS—SHEET 5.

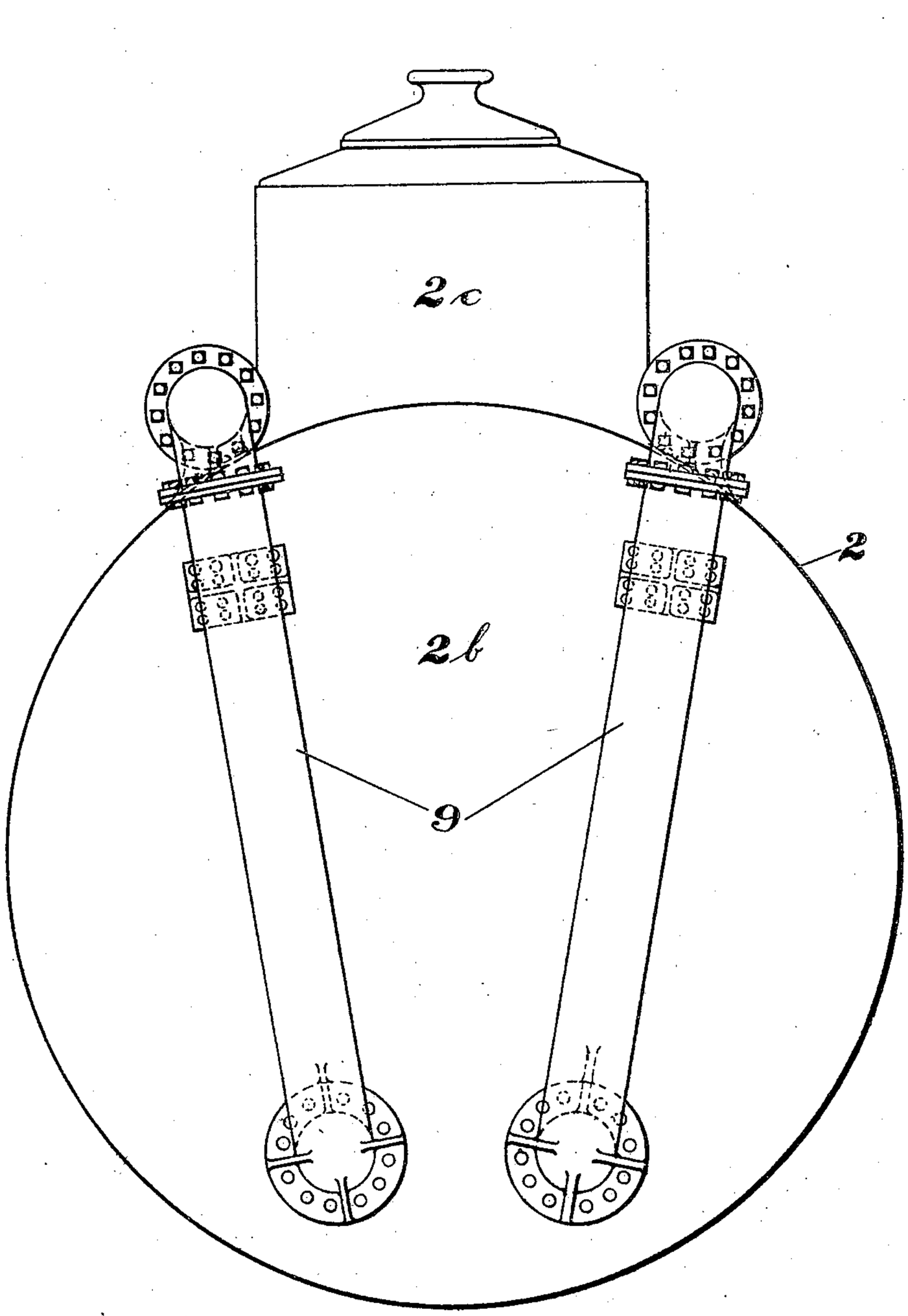

Fig. 9.

Witnesses
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6 SHEETS—SHEET 6.

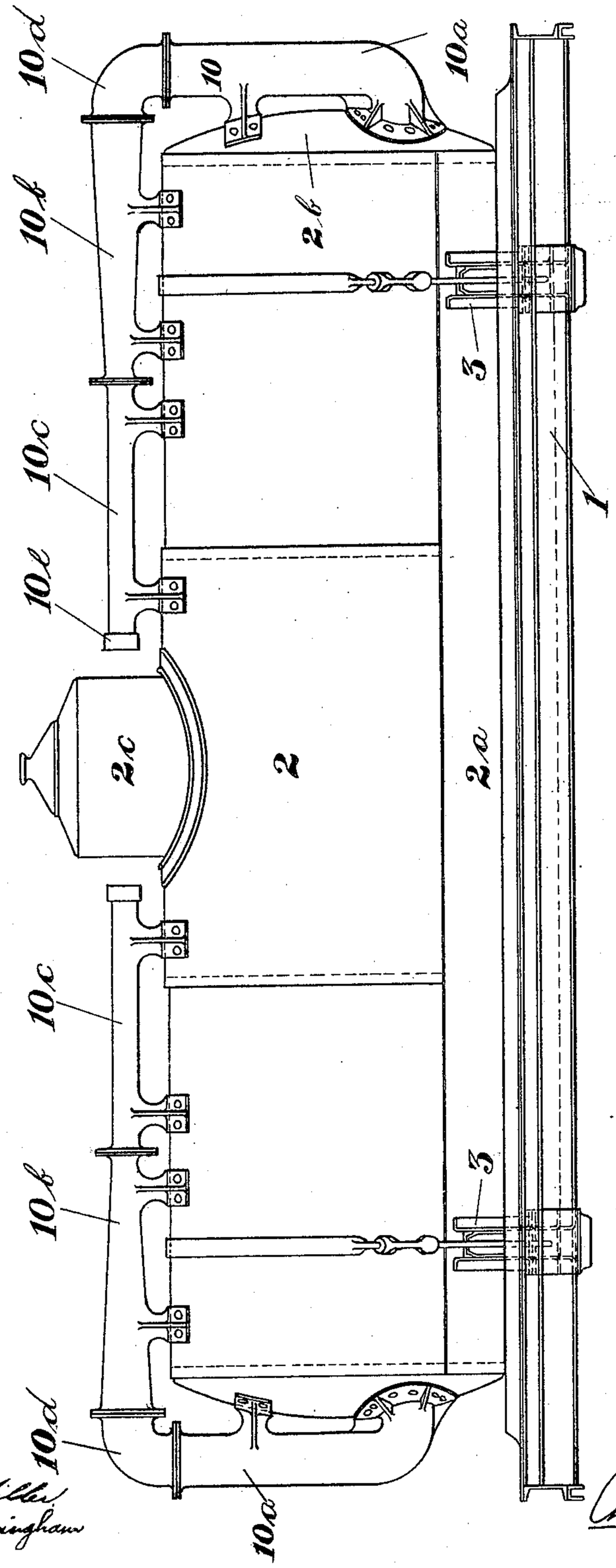

Fig. 10.

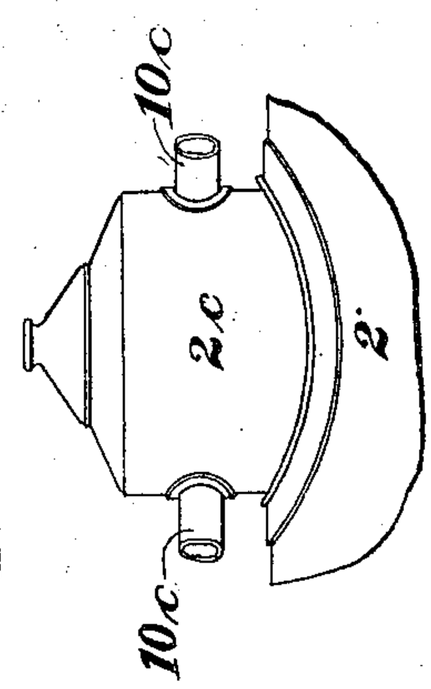

Fig. 11.

Witnesses

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Harry Cunningham

Inventor

Charles Lindström

UNITED STATES PATENT OFFICE.

CHARLES A. LINDSTRÖM, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO PRESSED STEEL CAR COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

TANK-CAR.

935,210. Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed January 7, 1909. Serial No. 471,078.

To all whom it may concern:

Be it known that I, CHARLES A. LINDSTRÖM, a citizen of the United States, residing at Pittsburg, Northside, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Tank-Cars, of which the following is a specification.

An object of the present invention is to obviate, as far as possible, the injurious effects of a sudden relative movement between a tank of a tank car and its liquid contents, due to buffing and pulling shocks.

A further object of the present invention is to provide for a tank an improved anchorage whereby it is secured to the car underframe.

A further object of the present invention is to combine the first-mentioned safety means and the said improved form of anchorage.

Referring broadly to the means for obviating the injurious effects on the tank, the underframe and connections, of buffing and pulling shocks, I have provided a means whereby the liquid contents of a tank acts on a trapped volume of air which forms a cushion and allows the liquid to come to a more gradual rest, thus partially absorbing the force due to sudden stopping of a train or due to sudden starting of a train, which force would otherwise be wholly absorbed by the connections between the tank and the underframe or by the head-blocks.

Referring broadly to the form of anchorage herein shown and described, the tank is rigidly secured to the car underframe in a plurality of places, preferably located near and on either side of the longitudinal center of the tank and car underframe so that contraction and expansion of the tank, due to temperature changes, and relative to the car underframe, is permitted as far as possible consistent with a secure mounting of the tank, the ends of the tank being so supported that the tank has a slidable relation to its underframe, so that such expansion or contraction of the tank on either side of its longitudinal center due to such temperature changes will not be restricted.

In a tank car embodying the form of anchorage herein shown and described, that is, where the tank is rigidly connected to the underframe, the evil effects of buffing and pulling shocks are increased due to the transmission of the entire force of the shock to the connections between the tank and underframe, and hence it is especially desirable to provide the tank with some means of counteracting such evil effects. It is to be understood, however, that the safety means forming a part of my invention is equally applicable to a tank car in which head blocks are used where the force of buffing and pulling shocks is partially absorbed by the movement of the tank relative to its underframe.

The invention is clearly described in the accompanying drawings in which like reference characters refer to like parts, and in which—

Figure 1 is a side elevation of a tank car equipped with the features of my invention; Fig. 2 is an end elevation of the tank, the understructure of the car being removed; Fig. 3 is a plan view of a portion of the underframe with the tank removed therefrom, illustrating in plan the tank anchoring device; Fig. 4 is a side elevation of a portion of the underframe and the tank in the immediate vicinity of the securing or anchoring devices, showing also in side elevation such anchoring devices; Fig. 5 is a detail sectional view of the same on the line 5—5, Fig. 4, looking in either direction; Figs. 6 and 7 are views similar to Figs. 4 and 5, showing a modified form of tank anchorage or securing means; Fig. 8 is a side elevation of the tank and of the underframing, showing a modification in the form of shock-absorbing means; Fig. 9 is a rear elevation of the same, the underframe being removed; Fig. 10 is a view similar to Fig. 8, showing a second modification of the shock-absorbing-means, and Fig. 11 shows a further modification of the construction shown in Fig. 10.

Referring now in detail to the drawings, 1 represents the car underframe, of suitable construction, 2 the tank, 3 the saddles at or near each end of the underframe which are so constructed that they extend transverse the car to support the car at its ends and forming a sliding relative movement between the tank and the underframe, tank 2 resting upon said saddles 3 with a slidable connection or without rigid connection thereto and being held on said saddles partially by its own weight and partially by the tank securing means or anchorage hereinafter described,

and if desired, by tank stays 4 suitably located throughout the length of the car.

5 are saddles or cradles extending longitudinally of the car and the tank, preferably one on either side and adjacent the longitudinal center of the tank and underframe, so that they are located approximately at the longitudinal center of the car but on either side thereof, so as to more effectively resist buffing and pulling shocks and counteract any sagging tendency in the tank and yet leave the tank substantially free for contraction or expansion of its metal due to temperature changes. The structure of these saddles 5 is clearly shown in Fig. 5, wherein they are shown as castings suitably ribbed to strengthen the same and provided with a concave upper surface with depending legs or vertical portions, the upper surface being riveted directly to the bottom sheet 2^a of the tank, the legs or vertical portions of saddles 5 being riveted to angle pieces or castings 6, which are in turn riveted to the car underframe and extending upwardly to receive the legs or vertical portions of saddles 5. The center sill construction of the underframe is of suitable construction, such as is shown, where it comprises a pair of channels 1^a spaced by upper and lower cover plates 1^b, 1^c. The anchorage or securing means for the tank, therefore, consists of a plurality of members riveted directly to the tank and a plurality of coöperating members riveted directly to the underframe, said members being riveted to each other in pairs. An advantage of these forming the securing means or anchorage for the tank lies in the fact that the cradle or concave member 5 may be riveted to the tank and the supporting angle members 6 riveted to the underframe independently of each other, the tank with its depending saddles or cradles 5 being then placed upon the saddles 3 or other supporting means so that such members 5 or their legs or vertical portions depend between the supporting or angle members 6, after which said members 6 may be riveted to the depending or vertical portions or legs of the cradle or saddle members 5, thus securing a fine or accurate adjustment of the tank to the underframe.

Referring now to the means for absorbing or relieving the tank of the injurious effects of buffing and pulling shocks, such means comprises outlets 7 in the opposite tank heads 2^b which are connected through means of piping 8. As shown in Fig. 1 of the drawings, piping 8 consists of vertical pipes 8^a suitably mounted on the tank heads 2^b, horizontal pipes 8^b connected to pipes 8^a through means of elbows 8^c, and circular pipes 8^d surrounding the tank dome 2^c which pipes 8^d are connected to pipes 8^b and to each other by means of T-pieces 8^e. It will be noted that outlets 7 are preferably located in the lower portion of the tank heads 2^b to give a greater length of piping 8 for absorption of shocks. It will also be noted that the circular pipes 8^d are of smaller diameter than the pipes 8^a, 8^b or elbow pieces 8^c, there being two of these pipes 8^d, one on each side of the dome 2^c and connected to pipes 8^b.

Assuming the tank to be filled with oil or other liquid, a sudden shock due to sudden stoppage of the train will throw the body of oil or liquid against one of the tank heads 2^b causing a severe shock against that head of the tank, which shock is absorbed by the cushioning effect of the air trapped in the vertical and horizontal portions of the piping 8 and by frictional resistance to the passage of the liquid through the piping 8, it being understood that when the tank is filled a portion of the liquid will rise in and partially fill pipes 8^a so that a volume of air is trapped in the upper portion of the piping 8, such volume of air being compressed under shock against the body of liquid lading at the opposite end of the tank. Assuming a train to be started in the same direction, a similar shock of lesser degree will be directed against the opposite head 2^b of the tank and will be cushioned in the same manner. The tank heads and connections between the tank and underframe are, therefore, partially relieved of stress and the life of the tank is greatly added to.

As shown in Figs. 6 and 7, the tank securing means or anchorage may be formed of bent plates. In such figures 5^a are plates having their upper edges bent to form concave opposing saddle members which are independent of each other save that they together form a saddle or cradle for supporting the tank in the same manner as saddles or cradles 5. Each of the plates 5^a is riveted to the bottom plate 2^a of the tank 2, and also to the upwardly projecting bent plates 6^a, which latter are riveted to the center sills 1^a in the same manner as the angles 6. In mounting the tank on the underframe, with this structure substantially the same method of alinement is followed as already described in connection with Figs. 3, 4 and 5, the plates 5^a being first riveted to the bottom sheet 2^a of the tank, the tank then being placed on its saddles 3 and the plates 5^a and 6^a then being riveted together.

In Figs. 8 and 9 is illustrated a modification of the safety piping wherein a plurality of pipes 9 extending from the lower portion of the tank heads 2^b upwardly over the top of the tank to either side of the dome 2^c, each pipe being continuous from end to end of the tank and the action or operation of the same being similar to that already described in connection with piping 8, except that the cushioning effect, where two pipes are employed, is still greater.

In Fig. 10 is shown a still further modification of the safety piping. This modification may be carried out with either one or more pipes extending from each tank head 2^b. Such modified construction consists in piping 10 extending from the tank head 2^b substantially to the tank dome 2^c, each piping 10 comprising a vertical pipe 10^a, a horizontal pipe 10^b, a horizontal pipe 10^c and a union 10^d between the pipes 10^b and 10^a. In this construction the piping 10 ends with a pipe 10^c through means of a cap 10^e at the end of pipe 10^c, and the pipe 10^c is preferably of smaller diameter than the pipe 10^b, the pipe 10^b being preferably smaller in diameter than the union 10^d and the pipe 10^a. If desired, as shown in Fig. 10, one or more of the pipes, such as 10^b, may be tapered. The advantage of the construction shown in Fig. 10 is that the volume of air is trapped absolutely in the upper end of the piping 10, greatly increasing the cushioning effect. The decreasing of the diameter of piping 10 toward its upper end also increases the resistance to shock.

If desired, as shown in Fig. 11, the pipes 10^c may be connected with the dome 2^c so that the air contained in dome 2^c will form a cushioning medium for the tank heads 2^b.

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

1. In a railway tank car, a tank and a shock absorbing air chamber outside the tank and connected to the interior of said tank at its end.

2. In a railway tank car, a tank and a shock absorbing air chamber located outside the tank and connected to the interior of said tank at the lower portion of its end.

3. In a railway tank car, a tank and a shock absorbing air chamber located outside the tank and connected to the interior thereof at the tank head.

4. In a railway tank car, a tank and a vertical shock absorbing air container connected to the tank at its head and communicating with the interior of the tank.

5. In a railway tank car, a tank and a pipe extending from one tank head to the other and forming a shock absorbing passageway.

6. In a railway tank car, means forming an independent, shock absorbing passageway extending between distant points of the tank.

7. In a railway tank car, a tank and means forming an independent, shock absorbing passageway connecting the lower portions of the tank heads.

8. In a railway tank car, a tank and means forming a shock absorbing passage for the liquid contents of said tank connected to the interior of the tank at the tank head.

9. In a railway tank car, a tank and means forming a shock absorbing passage for the liquid contents of said tank connected to the interior of the tank at the tank head and extending in an upward direction to cause the liquid to drain back from the upper portion of said passage after a shock.

10. In a railway tank car, a tank and means forming a shock absorbing passage for the liquid contents of said tank, opening into the tank at distant points to provide a looplike passage for the liquid under shock impetus.

11. In a railway tank car, a tank and means forming a shock absorbing passage for the liquid contents of the tank, said passage having a confined portion to increase resistance to the passage therein of a fluid body.

12. In a railway tank car having an underframe and a tank rigidly secured to said underframe at its longitudinal center to prevent longitudinal movement of said tank relative to said underframe, means forming a shock absorbing air chamber outside the tank and connected to the interior of said tank at its end.

13. In a railway tank car having an underframe and a tank rigidly secured to said underframe at its longitudinal center and supported on the underframe at its ends in a manner to permit expansion and contraction of the metal in the tank, means forming a shock absorbing air chamber outside the tank and connected to the interior of the tank at its end.

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

CHARLES A. LINDSTRÖM.

Witnesses:

FRANK E. MILLER,

H. B. FISHER.