

APPLICATION FILED JUNE 25, 1908.

Patented May 31, 1910.

3 SHEETS--SHEET 1.



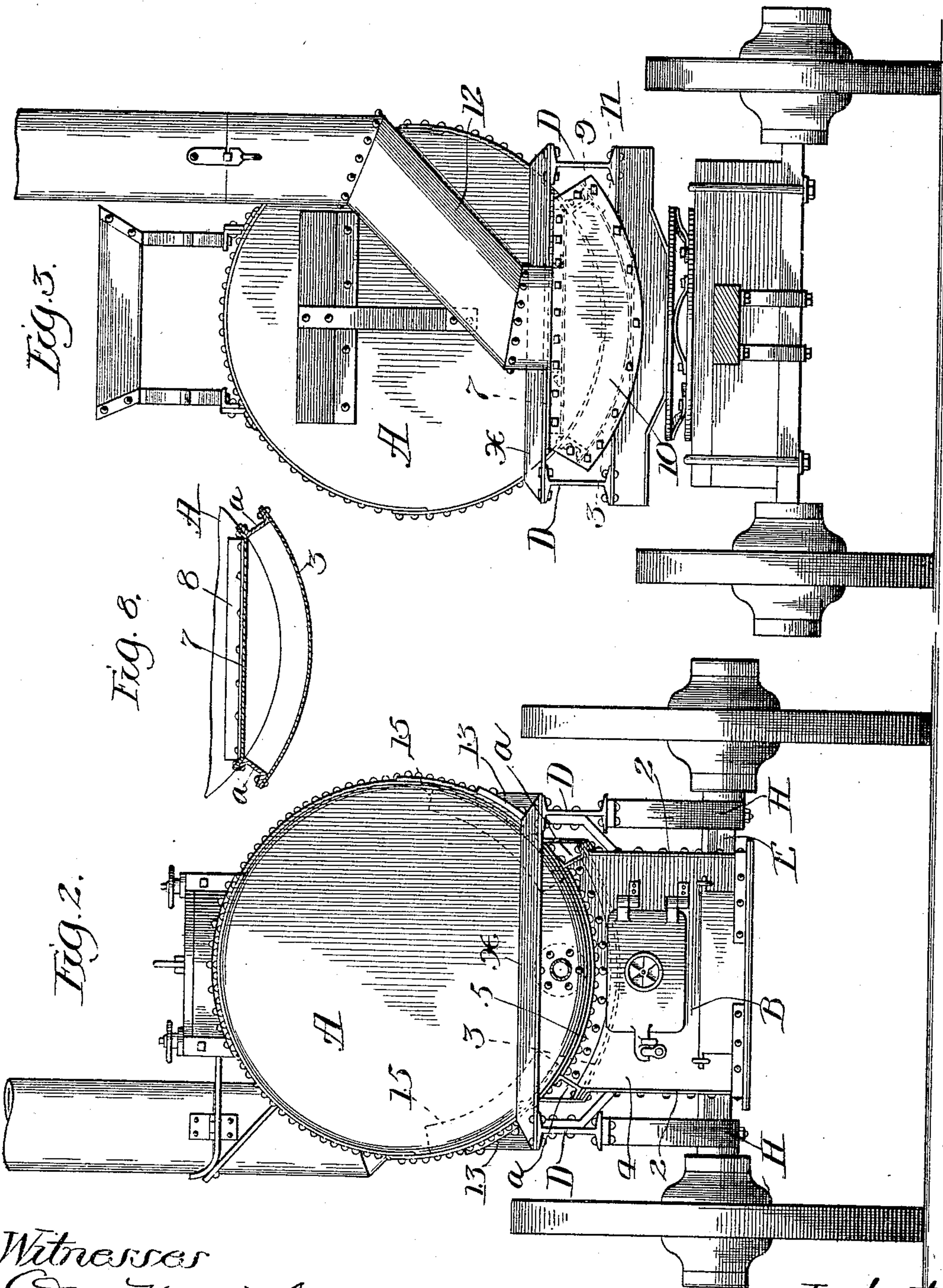
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W. & A. MACD. GRAVER.  
TANK WAGON.  
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960,165.

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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 4

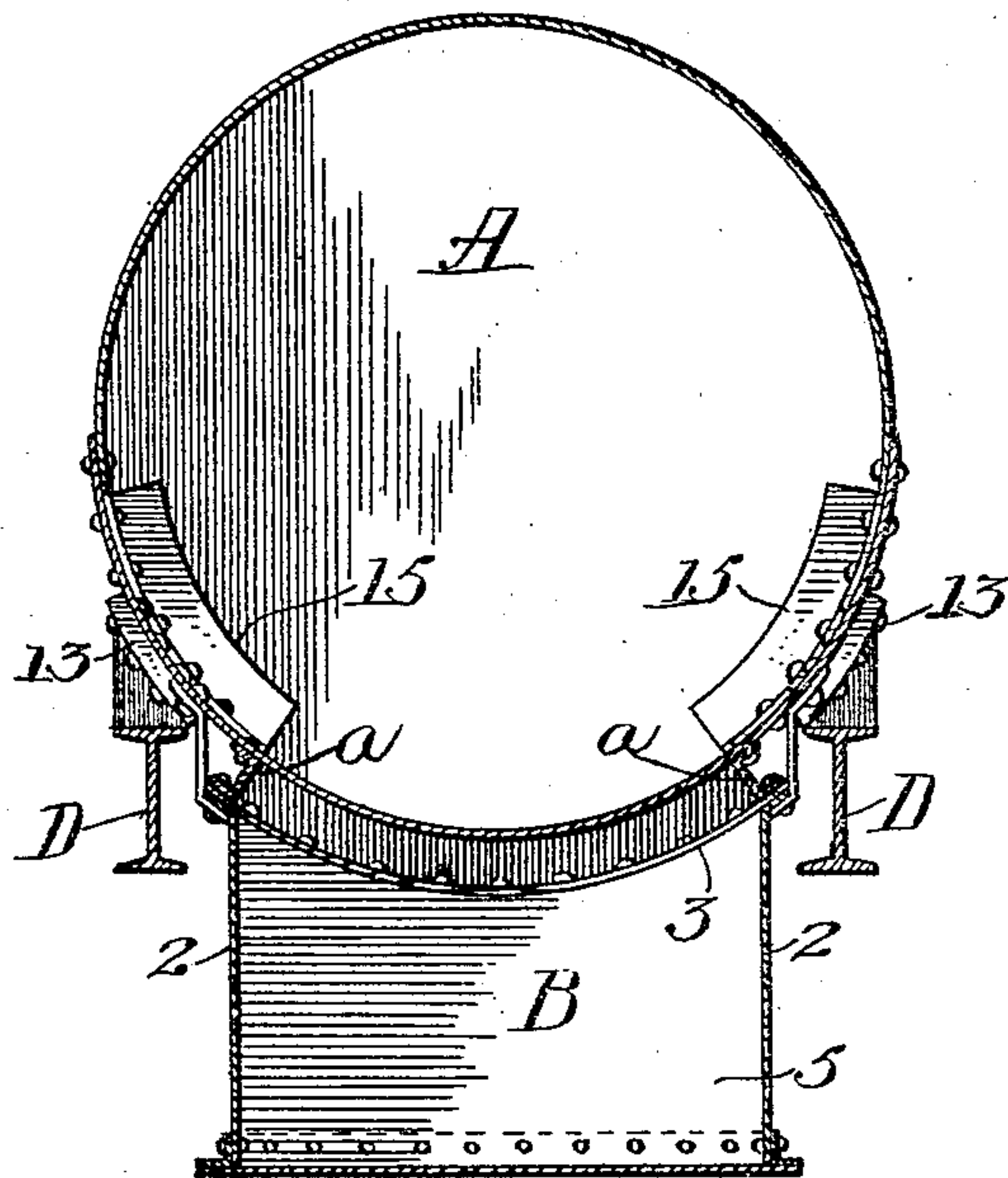


Fig. 5.

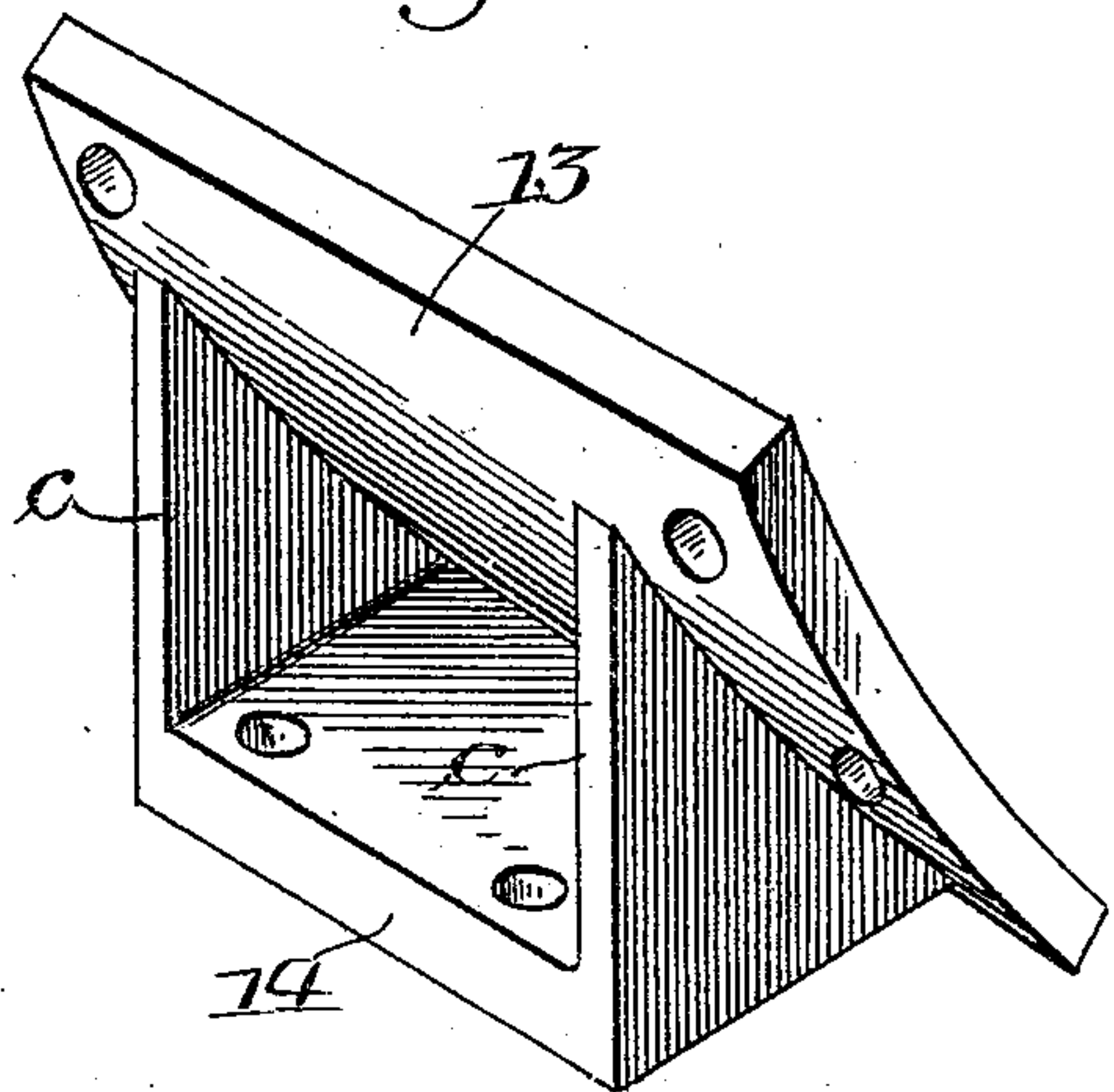


Fig. 6.

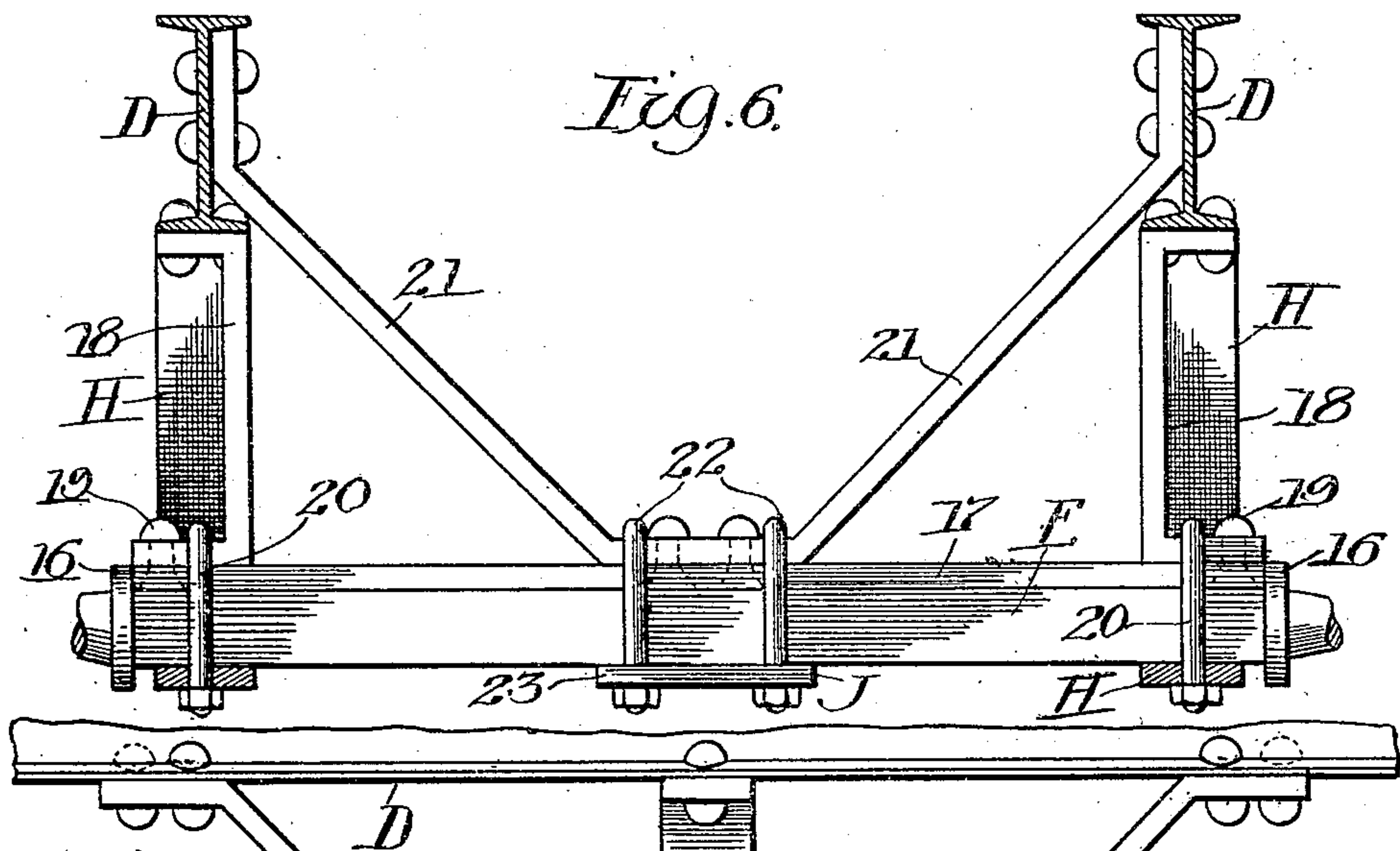
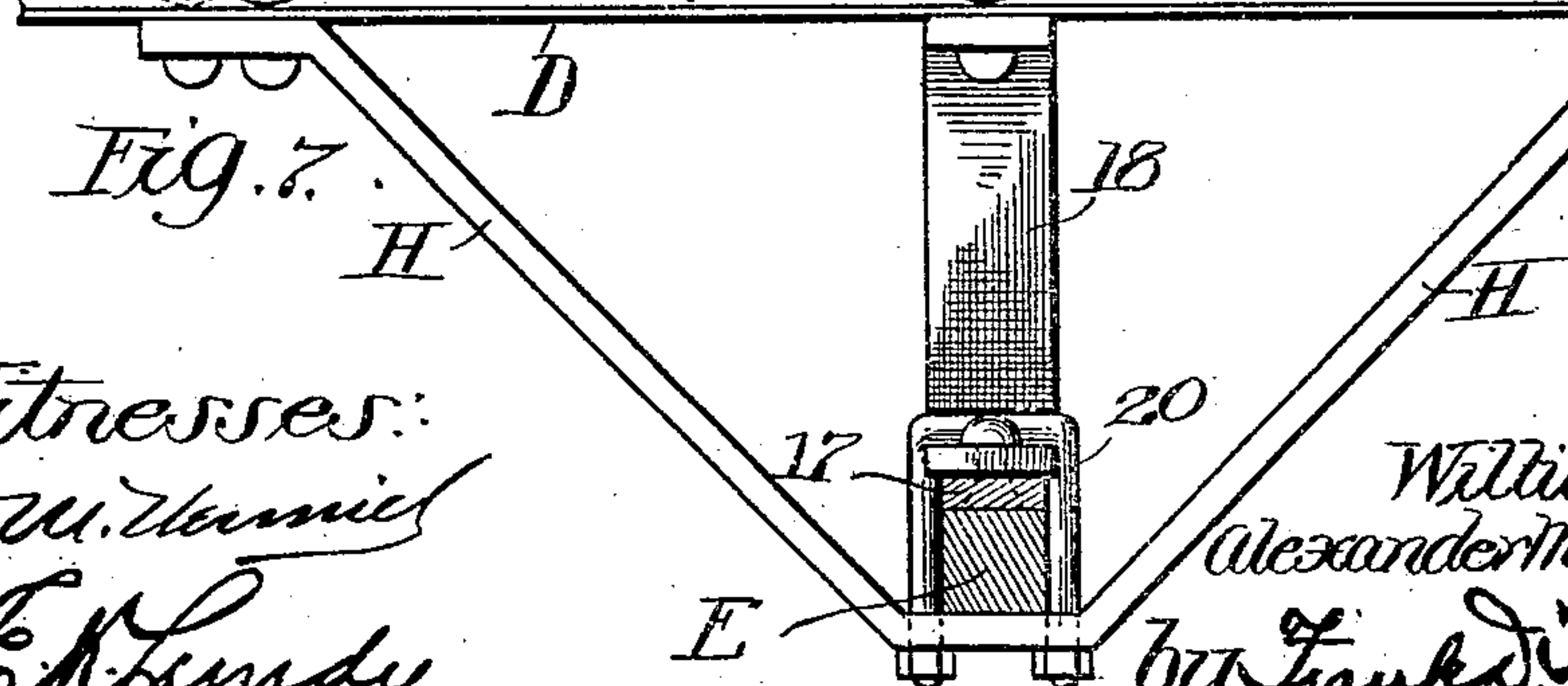


Fig. 7.



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# UNITED STATES PATENT OFFICE.

WILLIAM GRAVER AND ALEXANDER MACDONALD GRAVER, OF CHICAGO, ILLINOIS.

## TANK-WAGON.

960,165.

Specification of Letters Patent.

Patented May 31, 1910.

Application filed June 25, 1908. Serial No. 440,341.

*To all whom it may concern:*

Be it known that we, WILLIAM GRAVER and ALEXANDER MACDONALD GRAVER, both citizens of the United States, and residents of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tank-Wagons, of which the following is a clear, full, and exact description.

Our invention relates to tank wagons, and particularly the kind used for conveying tar, bitumen, and other heavy hydro-carbons in a liquid state.

The object of our invention is to construct, in an economical manner, the supporting-gear for the tank largely of structural metal, in such manner that both rigidity and strength is imparted to the same.

A further object of our invention is to so construct the fire-chamber and smoke-flue extending therefrom longitudinally under the tank, that, when it is desired to replace or repair the parts of the same, it can be done without affecting the connection of the sides thereof with the tank; substantially as hereinafter fully described and as particularly pointed out in the claims.

In the drawings:—Figure 1 is a side elevation of our invention showing the nigh wheels removed. Fig. 2 is a rear end elevation. Fig. 3 is a front end elevation. Fig. 4 is a transverse vertical section of the tank and fire-chamber. Fig. 5 is a perspective view of the tank-lugs. Figs. 6 and 7 show side and end views, respectively, of the rear axle, bolster and elements attached to and supporting the side-sills. Fig. 8 is a detail view showing a transverse section through the smoke-box.

Referring to the drawings A represents a tank, which is, preferably, cylindrical, and extends from in front of the front axle of the wagon to a point a suitable distance to the rear of the rear axle. This tank has longitudinal channel-beams *a, a*, secured to its bottom on each side of the longitudinal vertical plane intersecting its axis, which extend from near the rear end of the tank to a point a suitable distance in front of the front end of the same. These channel-beams are so arranged that their flanges project outward, and, to the rear of the rear axle, the outwardly flanged upper edges of the sheet metal side-walls 2, 2, of the fire-chamber B are riveted or otherwise secured thereto. Between the front side of the fire-cham-

ber and their forward ends, the lower flanges of these beams are connected by a downwardly curved horizontally disposed plate 3, the curvature of which is struck from the center of the tank, and these channel-beams *a, a*, and plate 3 form a flue under the tank extending from the fire-chamber to the smoke-box in front of the smoke, which box will be hereinafter more fully described. The upper edge of the front-wall 4 of the fire-chamber is flanged forward, and laps under and is riveted or otherwise secured to the rear edge of plate 3, and the upper edge of the rear sheet metal wall 5 of the fire-chamber is riveted or otherwise secured to the vertically disposed portion of a transverse angle-iron strip 6, whose horizontal portion is riveted or otherwise suitably secured directly to the tank. As thus constructed the walls of the fire-box are not connected directly to the tank, and can be removed for repairs or replacements without affecting the tank whatsoever. The remaining features of this fire-chamber B are constructed in accordance with well known principles, to which further reference is deemed unnecessary.

The portion of the channel-beams *a*, and plate 3 extending in front of the tank form the sides and bottom of a smoke-box, that is covered over by a transverse horizontal plate 7, which latter has its side edges riveted or otherwise secured to the upper flanges of said channel-beams; its rear edge secured to the adjacent head of the tank by a transverse angle-iron strip 8, and its front edge provided with a transverse angle-iron strip 9 by means of which the front-plate 10 of the smoke-box is riveted or otherwise secured to the same. The front end edge of plate 3 has a transverse angle-iron strip 11 secured to its underside, and the lower edge of plate 10 is secured to this strip 11. By using bolts and nuts to secure plate 9 in place, it can be easily removed when desired. A pipe 12 is secured to and leads from an upwardly flanged opening in the center of plate 7, which inclines upwardly toward the side of the wagon and then vertically so as to make room for the driver's seat and foot-rest, substantially as shown in Fig. 3 of the drawings.

The tank is supported in a substantially horizontal position by means of tank-lugs 13, which latter are shown in perspective in Fig. 5 of the drawings, and consist, pref-



erably, of a cast metal segmental plate, that is riveted or otherwise secured to the sides of the tank below its center, and have downwardly projecting triangular shaped webs *c*, the lower horizontal edges of which are connected by a horizontal foot 14, that rests upon and is secured to the upper flanges of the I-beam side-sills D, D. As shown in the drawings, two pair of these tank-lugs are used,—one in the transverse vertical plane of the rear axle, and the other in a transverse vertical plane to the rear of the front axle. I prefer to reinforce the sides of the tank in the transverse plane of lugs 13 by securing to their inner surfaces vertically disposed segmental strips of angle-iron, 15, that extend from a point in the vicinity of the channel-beams *a* to a point above the plane of the tank-lugs, as shown. The side-sills are placed in a longitudinal vertical plane outside of the channel-beams *a*, and they extend from a short distance to the rear of the tank to a short distance in front of the same, and have their extended ends connected by transverse angle-iron bars or end-sills *x*, *x*, the vertical portions of which bear against the ends of the tank, and assist in preventing the longitudinal displacement of the same, or the consequent shearing of the rivets or bolts by means of which the tank-lugs are connected to said side-sills. The rear axle E of the wagon is located just in front of and in a horizontal plane just above the bottom of the fire-chamber, and it is reinforced by a superposed longitudinal bar 17, the ends of which abut against flanges 16, 16, of the spindles. Secured upon the ends of bar 17 are posts 18, whose lower ends are bent outwardly to form the feet that rest upon the bar and are, preferably, secured thereto by rivets 19, and by the inverted U-bolts 20. The upper ends of the posts 18 are bent outwardly in the same direction as their lower ends, and support the sills, to the lower flanges of which they are, preferably, riveted. The lower screw-threaded ends of the U-bolts 20 extend through the center of length of a longitudinally disposed brace H, which latter passes under the axle, and has its ends extended upward at a suitable angle to sills D, to which they are riveted or bolted. The sills D are also braced to prevent any independent lateral movement thereof, by means of the transverse braces 21, which consist of a somewhat V-shaped metal bar whose ends are bent vertically so as to bear flat against the inner circumference of the webs of the sills D, with their extremities bearing up against the underside of the upper flange thereof, in which position they are riveted to the sills. From the sills this transverse brace inclines downward toward the center of the axle where it is provided with a horizontal portion that

rests upon and is secured to the reinforcing bar 17 of the axle by means of rivets, and to said axle by inverted U-shaped bolts or clips 22, whose lower screw-threaded ends extend down through a suitable plate 23, and are tightened by means of nuts on their lower ends, substantially as shown. If desired, braces 21 and post 18 may be slightly wider than the axle, and may be provided with slight recesses in its edges for the accommodation of the bolts or clips 20 and 22, so that when the same are properly assembled, transverse movement thereof will be absolutely prevented.

The forward end of the sills D are supported by a series of two or three transverse I-beam bolsters *k*, the ends of which have their upper flanges riveted or bolted to the lower flanges of the sills, and the central portions of which are bent downward to enable them to pass under the plate 3 of the smoke-flue, and have the upper circular member K of the fifth wheel secured in any suitable manner thereto.

We do not claim any invention in and to the construction of the running-gear connected with the front wheels of our tank wagon, and, therefore, do not consider a more extended reference thereto necessary.

What we claim as new is:—

1. A tank-wagon comprising a tank, a fire-chamber under one end thereof, and a flue extending therefrom longitudinally under the entire length of said tank; the shell of the tank forming the top of the flue, the sides thereof consisting of longitudinal metal flanged beams the upper flanges of which are permanently secured to the tank, and the bottom of which consists of a plate whose side edges are secured to the lower flanges of said beam.

2. A tank-wagon comprising a tank, a fire-chamber under one end thereof, and a flue extending therefrom longitudinally under the entire length of said tank, the shell of the tank forming the top of the flue, the sides thereof consisting of longitudinal metal flanged beams the upper flanges of which are permanently secured to the tank and the bottom of which consists of a transversely curved plate whose side edges are secured to the lower flanges of said beams and the curvature of which is struck from the center of the tank.

3. A tank-wagon comprising a tank, a fire-chamber under one end thereof, and a flue extending therefrom longitudinally under the tank the sides of which consist of flanged metal beams whose upper flanges are secured direct to the tank and have their ends extended to the entrance end of the fire-chamber, which latter has the upper edges of its sides secured to the lower flanges of said beam.

4. A tank wagon comprising a tank, a



fire-chamber under one end thereof, and a flue extending therefrom under the tank the sides of which consist of flanged metal beams whose upper flanges are secured direct  
 5 to the tank, and the bottom thereof consisting of a transversely curved plate the longitudinal edges of which are secured to the lower flanges of said beams, which latter have their ends extended beyond the end  
 10 edge of the flue to the rear of the fire-chamber, the upper edges of whose side-walls are secured to the lower flange of said beams.

5. A tank-wagon comprising a tank, a fire-chamber under one end thereof and a  
 15 flue extending therefrom longitudinally under said tank, the sides of which consist of longitudinal metal beams the ends of which opposite the fire-box extend beyond the end of the tank and form the sides of the smoke-box, a plate the side edges of  
 20 which are secured to the lower flanges of said beams, a horizontal plate in front of the tank forming the top of the smoke-box, and a vertical plate forming the end of the smoke-box farthest from said tank.  
 25

6. A tank-wagon comprising a tank, a fire-chamber under one end thereof, and a flue extending therefrom longitudinally under said tank, the sides of which consist of  
 30 longitudinal metal beams the ends of which opposite the fire-box extend beyond the end of the tank and form the sides of the smoke-box, a plate the side edges of which are secured to the lower flanges of said beams, a  
 35 horizontal plate in front of the tank forming the top of the smoke-box, the side edges of which are secured to the upper flanges of said beams, a vertical plate forming the end of the smoke-box farthest from said tank,  
 40 and angle-iron strips securing the front and rear transverse edges of the top-plate of the smoke-box to the tank and front-plate.

7. A tank-wagon comprising a tank, a fire-chamber under one end thereof, and a  
 45 flue extending therefrom longitudinally under said tank the sides of which consist of longitudinal metal beams the ends of which opposite the fire-box extend beyond the end of the tank and form the sides of the smoke-box, a transversely curved plate  
 50 the side edges of which are secured to the lower flanges of said beams, the curvature of which is struck from the center of said tank, a horizontal plate in front of the tank  
 55 forming the top of the smoke-box, and a vertical plate forming the end of the smoke-box farthest from said tank.

8. A tank-wagon comprising a tank, a fire-chamber under one end thereof, and a  
 60 flue extending therefrom longitudinally under said tank the shell of the tank forming the top of said flue, and the bottom consisting of a transversely curved plate, the curvature of which is struck from the center of  
 65 said tank, I-beam side-sills whose ends ex-

tend beyond the end of the tank, end-sills connecting said extended ends, and tank-lugs secured to the tank and resting upon and secured to said side-sills.

9. A tank-wagon comprising a tank, a  
 70 fire-chamber under one end thereof, and a flue extending therefrom longitudinally under said tank the shell of the tank forming the top of said flue, and the bottom consisting of a transversely curved plate, the curva-  
 75 ture of which is struck from the center of said tank, I-beam side-sills whose ends extend beyond the end of the tank, angle-iron end-sills connecting said extended ends and contacting with the ends of said tank, and  
 80 tank-lugs secured to the tank and resting upon and secured to said side-sills.

10. A tank-wagon comprising a tank, a fire-chamber under one end thereof, and a  
 85 flue extending therefrom longitudinally under said tank, the shell of the tank forming the top of the flue, the sides thereof consisting of longitudinal metal beams the upper flanges of which are permanently secured to the tank, and the bottom of which consists  
 90 of a plate whose side edges are secured to the lower flanges of said beam, I-beam side-sills whose ends extend beyond the end of the tank, end-sills connecting said extended ends, and tank-lugs secured to the tank and  
 95 resting upon and secured to said side-sills.

11. A tank-wagon comprising a tank, a fire-chamber under one end thereof, and a  
 100 flue extending therefrom longitudinally under said tank, the shell of the tank forming the top of the flue, the sides thereof consisting of longitudinal metal beams the upper flanges of which are permanently secured to the tank and the bottom of which consists of a transversely curved plate whose side edges  
 105 are secured to the lower flanges of said beams and the curvature of which is struck from the center of the tank, I-beam side-sills whose ends extend beyond the end of the tank, end-sills connecting said extended  
 110 ends, and tank-lugs secured to the tank and resting upon and secured to said side-sills.

12. A tank-wagon comprising a tank, a fire-chamber under one end thereof, a flue  
 115 extending therefrom longitudinally under said tank, said fire-chamber having the upper edges of its walls secured indirectly to said tank, I-beam side-sills whose ends extend beyond the end of the tank, end-sills  
 120 connecting said extended ends, and tank-lugs secured to the tank and resting upon and secured to said side-sills.

13. A tank-wagon comprising a tank, a fire-chamber under one end thereof, a flue  
 125 extending therefrom longitudinally under said tank, and metal beams connecting the side and rear walls of said fire-chamber to the tank, I-beam side-sills whose ends extend beyond the end of the tank, end-sills  
 130 connecting said extended ends, and tank-



lugs secured to the tank and resting upon and secured to said side-sills.

14. A tank-wagon comprising a tank, a fire-chamber under one end thereof, a flue  
5 extending therefrom longitudinally under the tank the sides of which consist of metal beams whose upper flanges are secured direct to the tank and have their ends extended to the entrance end of the fire-chamber,  
10 which latter has the upper edges of its sides secured to the lower flanges of said beam, I-beam side-sills whose ends extend beyond the end of the tank, end-sills connecting said extended ends, and tank-lugs secured to the  
15 tank and resting upon and secured to said side-sills.

15. A tank-wagon comprising a tank, a fire-chamber under one end thereof, a flue  
extending therefrom under the tank the  
20 sides of which consist of metal beams whose upper flanges are secured direct to the tank,

and the bottom thereof consisting of a transversely curved plate the longitudinal edges of which are secured to the lower flanges of said beams, which latter have  
25 their ends extended beyond the end edge of the flue to the rear of the fire-chamber, the upper edges of whose side-walls are secured to the lower flange of said beams, I-beam side-sills whose ends extend beyond  
30 the end of the tank, end-sills connecting said extended ends, and tank-lugs secured to the tank and resting upon and secured to said side-sills.

In testimony whereof we have hereunto  
35 set our hands and seals this 8th day of June, A. D., 1908.

WILLIAM GRAVER. [L. s.]

ALEXANDER MACDONALD GRAVER. [L. s.]

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