

(No Model.)

2 Sheets—Sheet 1.

W. E. EASTMAN.

APPARATUS FOR HEATING FREIGHT CARS.

No. 253,521.

Patented Feb. 14, 1882.

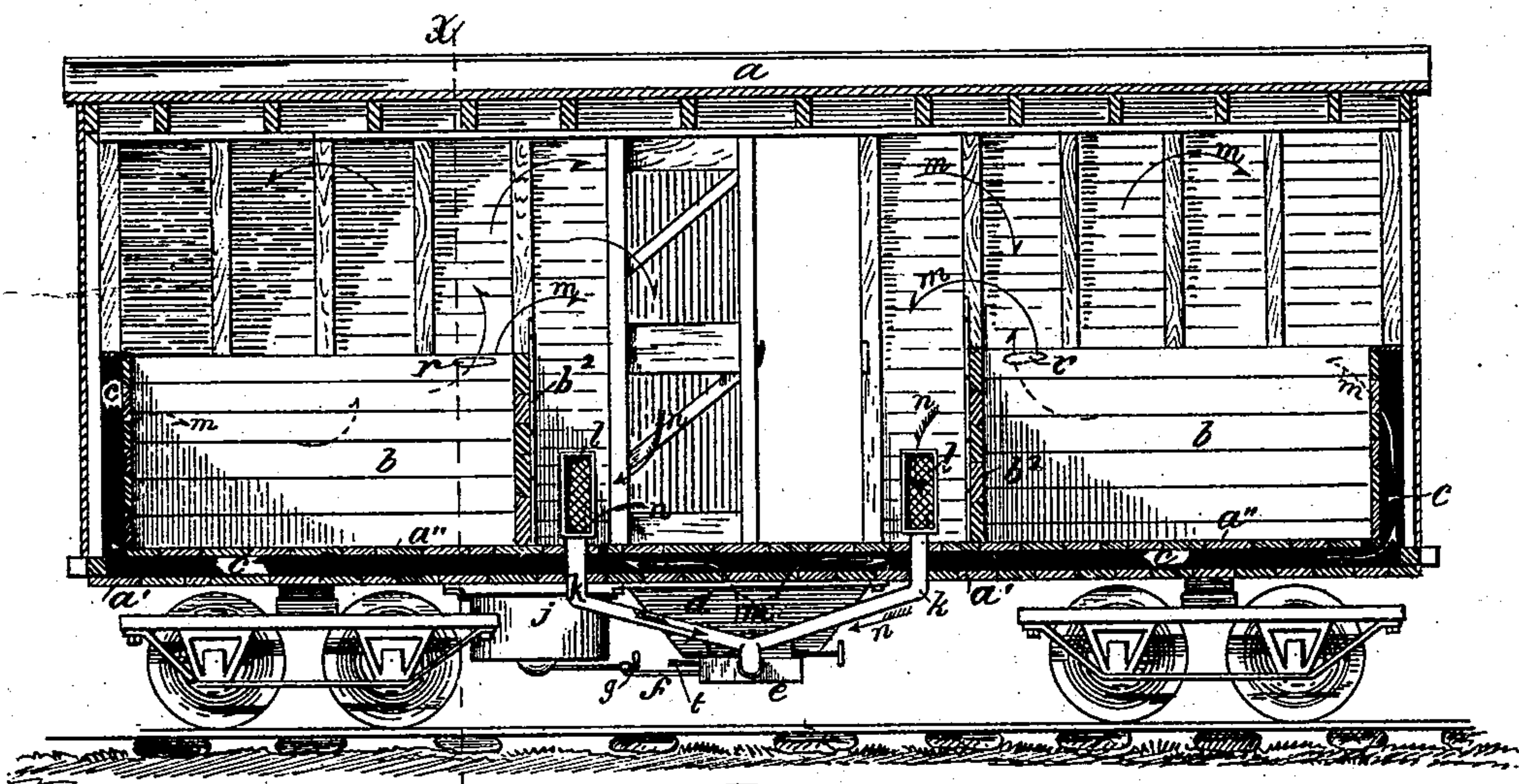


Fig. 1.

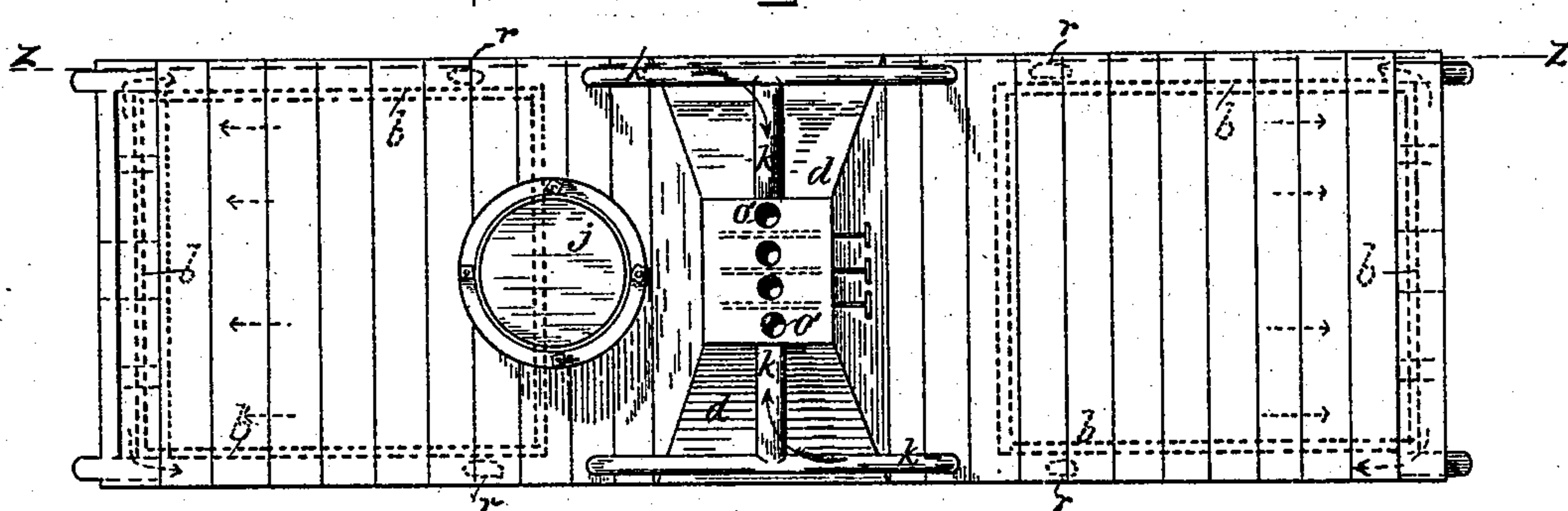


Fig. 2.

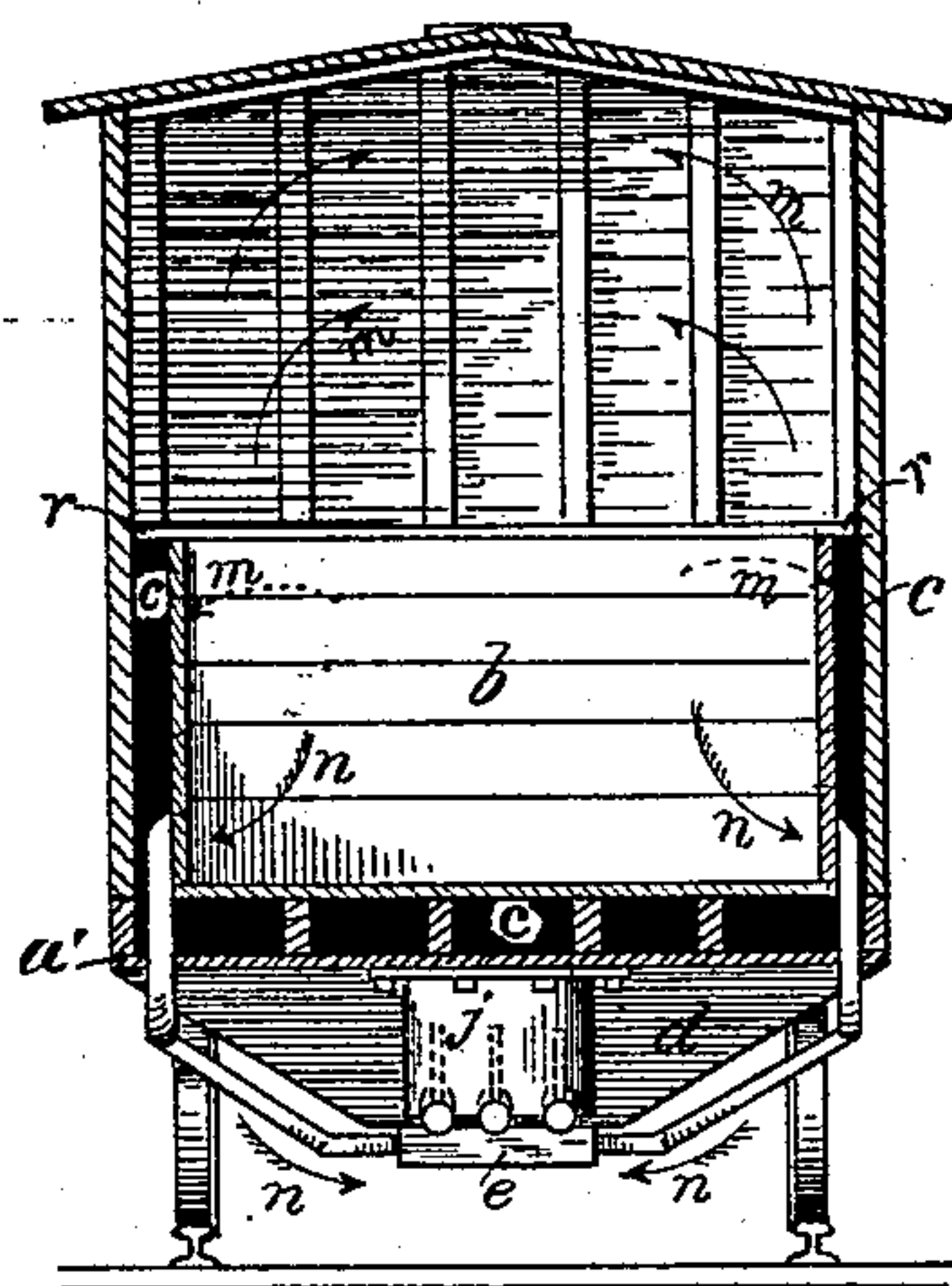


Fig. 3.

Witnesses:
Wm. H. Miller
H. E. Remick

Inventor:
William E. Eastman

(No Model.)

2 Sheets—Sheet 2.

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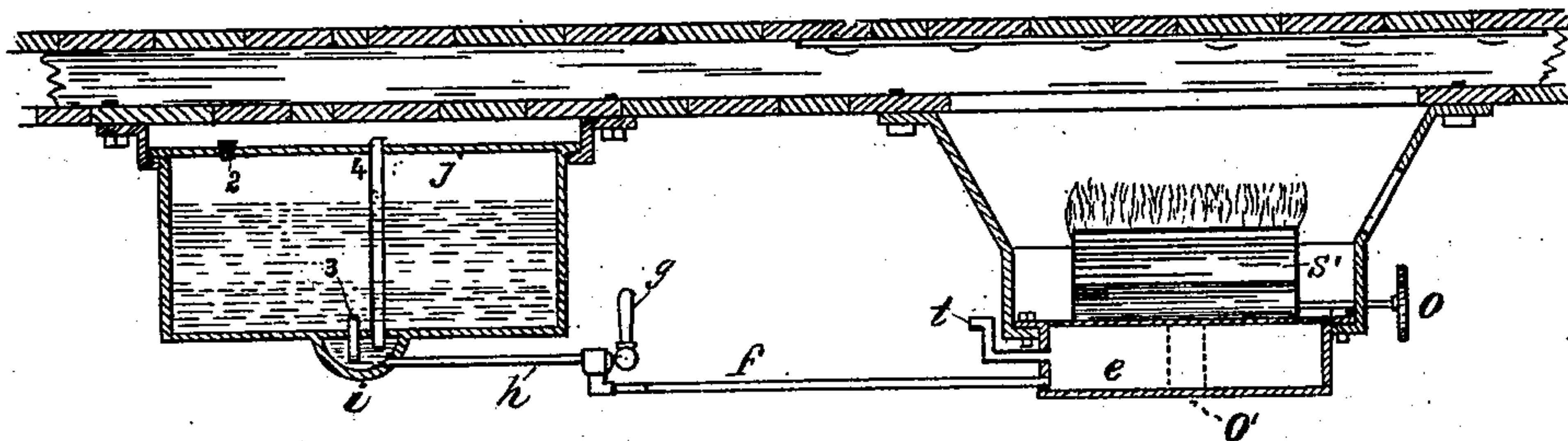


Fig. 4.

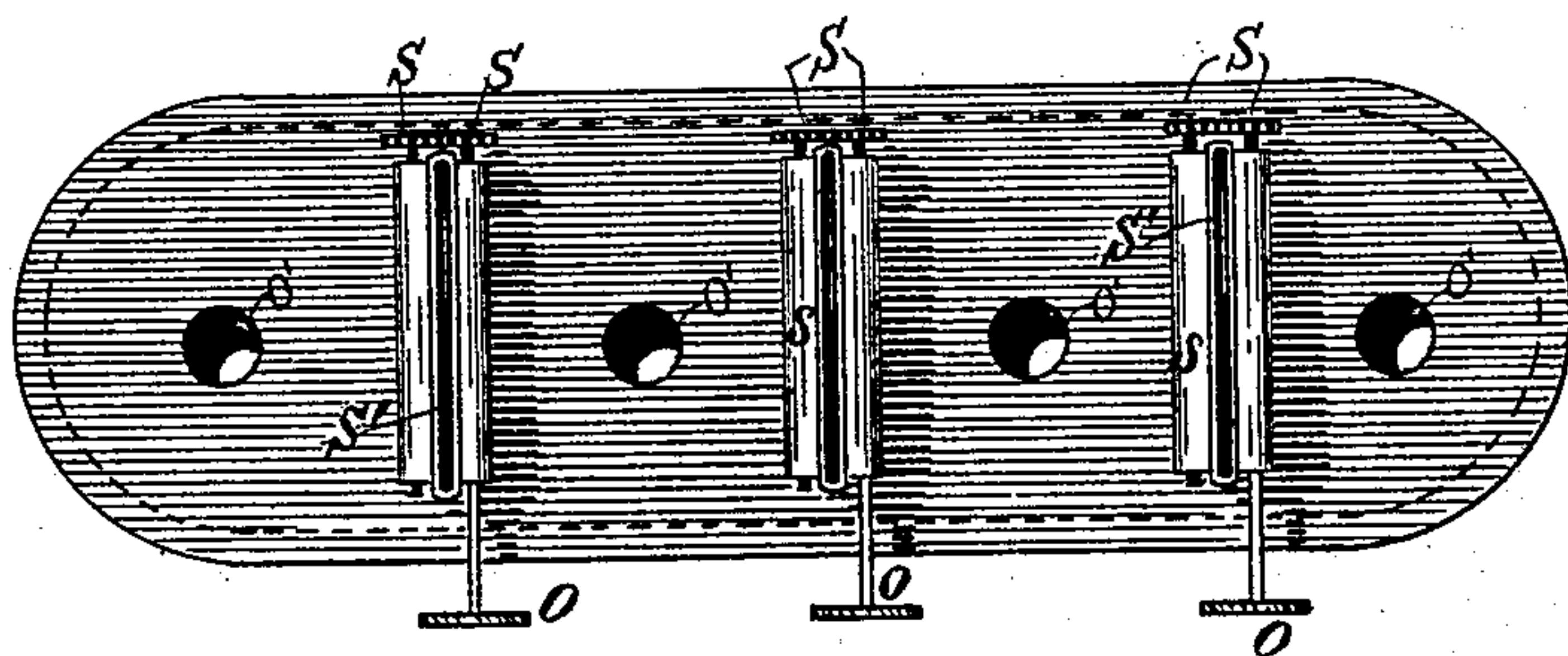


Fig. 5.

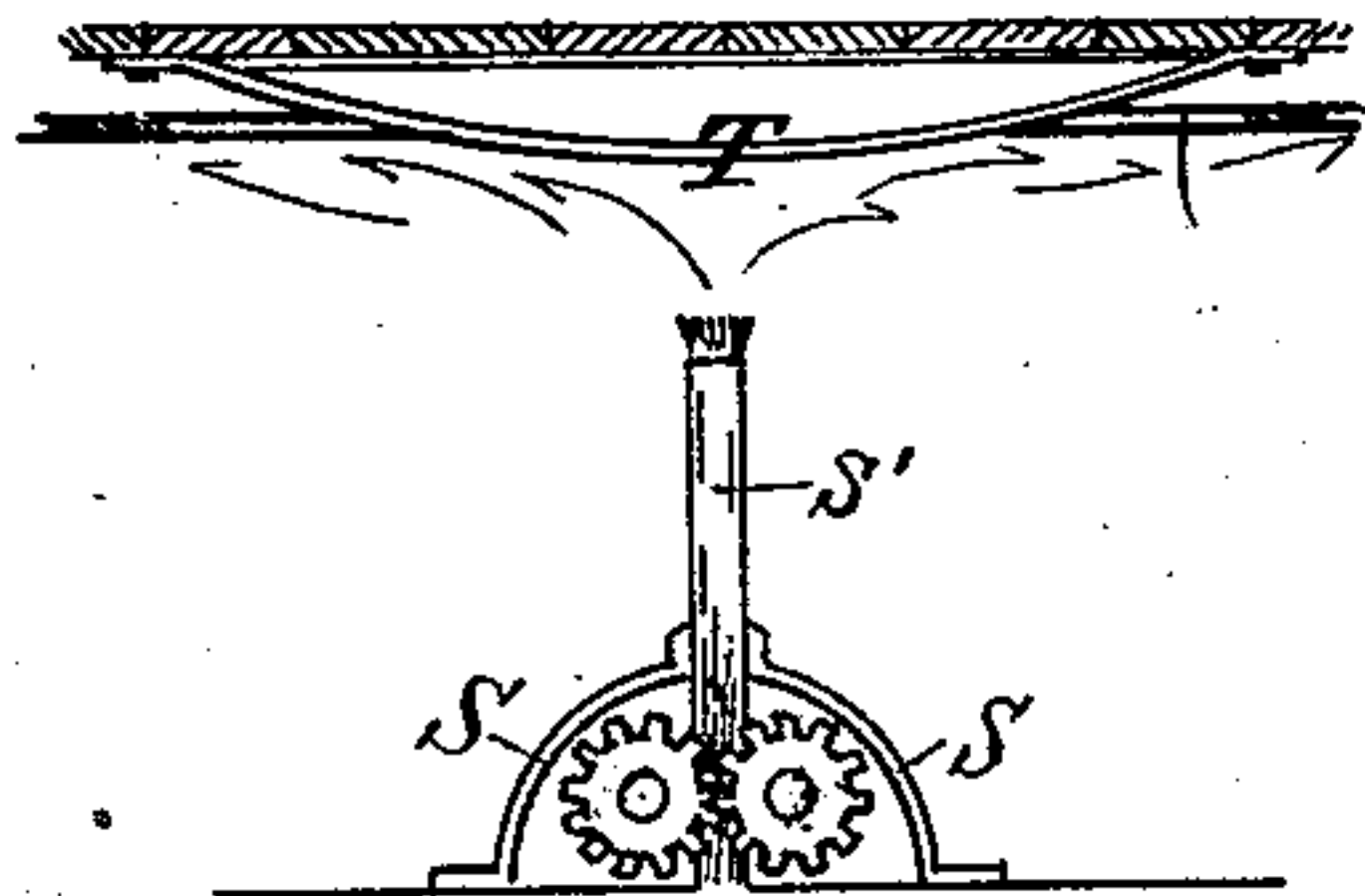


Fig. 6.

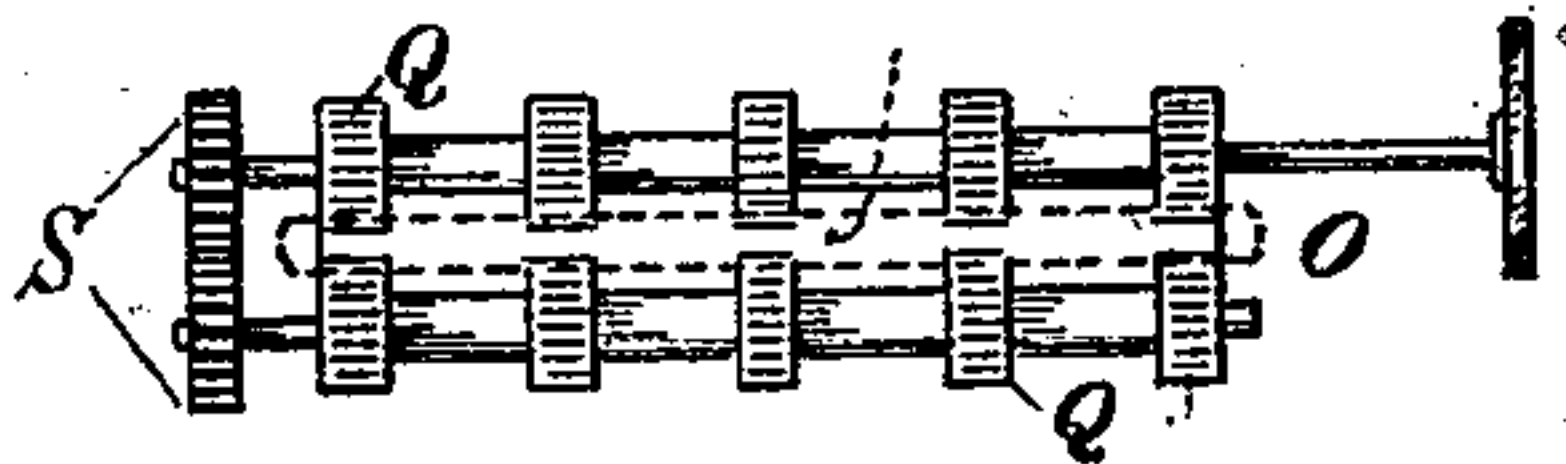


Fig. 7.

Witnesses.

Harry E. Remick,
Wm. H. Miller

Inventor.

William E. Eastman

UNITED STATES PATENT OFFICE.

WILLIAM E. EASTMAN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE
AMERICAN FREIGHT CAR HEATER COMPANY, OF PORTLAND, MAINE.

APPARATUS FOR HEATING FREIGHT-CARS.

SPECIFICATION forming part of Letters Patent No. 253,521, dated February 14, 1882.

Application filed November 25, 1881. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. EASTMAN, a citizen of the United States of America, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Heating Freight-Cars; and I do hereby 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 letters or figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide means whereby produce or other articles of merchandise which are injured by being subjected to a low temperature may be safely transported in the winter, and this I accomplish by providing a freight-car having a heating apparatus attached and so constructed that currents of heated air evenly distribute heat throughout the car.

My present invention is an improvement on that shown and described in Letters Patent No. 247,028, September 13, 1881, granted to myself, C. H. Kimball, and C. H. Murch, and also that shown and described in an application filed by myself and the persons named on July 7, 1881, and allowed October 11, 1881, wherein are fully set forth the object and advantages of an apparatus of this kind; but I will here state that the use which my invention is more particularly designed for is the safe transportation of potatoes from the country to the cities during the winter. By its use serious delays are avoided in importing potatoes and other vegetables from Canada, because the cars can be sealed, and, passing intermediate custom-houses, be entered at their destination. Losses by theft are also avoided, as it is never necessary to enter a car to regulate the heat or to replenish the fire.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a car (through line *z*, Fig. 2) constructed according to my improved invention. Fig. 2 shows a bottom plan thereof. Fig. 3 is a vertical transverse section through line *x*, Fig. 1. Fig. 4 is a verti-

cal section, showing in detail the construction of the heating apparatus. Fig. 5 is a top view or plan of the heater proper, showing the wick-tubes and gearing of the wick-elevators. Fig. 6 shows also the gearing of the apparatus for controlling the wick and a wick-tube, also a metallic deflector above the wick-tube; and Fig. 7 shows more in detail the construction of the wick-controlling device.

The fuel which I use is a liquid hydrocarbon, preferably the ordinary kerosene-oil of commerce, and is contained in the tank *j*, Figs. 1 and 4. From this it is fed automatically, as required, to the burner-tank *e*.

The automatic tank (shown in detail in Fig. 4) is an important part of my invention, and its operation is as follows: The cock *g* being in such position that no oil can enter tube *f* from tube *h*, the plug 2 is removed and the tank filled through the opening at 2. Tube 3 is open at both ends, the upper end opening into the main tank *j* and the lower into the trap or supplemental tank *i*. Tube 4 is open at both ends, the upper end opening to the outside air and the lower into the trap *i*.

In filling tank *j* oil descends through tube 3 into trap *i*, and ascends in tube 4 to a level with the oil in the tank. When the tank shall have been filled nearly or quite full the plug 2 is replaced, so that the tank is hermetically sealed, except as regards tubes 3 and 4. The cock *g* is now opened and the oil allowed to flow to the lamp-tank *e*. At first the oil standing in tube 4 descends into the trap *i*, and all the oil therein down to a level with the bottom of tube 3 flows to the lamp-tank *e*. As soon as the oil in the trap *i* shall have fallen to the point indicated air admitted through tube 4 begins to bubble up through tube 3, and a corresponding quantity of oil will descend and flow to the lamp-tank *e*; and this will continue until the level of the oil in the lamp-tank is as high as the lower end of tube 3, when it will cease, because no more air can enter tank *j*. The level of the oil in the lamp-tank will then theoretically always be maintained so long as there remains any oil in tank *j*; but in practice it is found that it is best to allow some space in the lamp-tank above this point to compensate for

expansion of the oil and air in the tank *j*, and for a variation in the relative positions of the tank and lamp or heater, caused by grades and irregularities of the railway-track.

5 To guard also against accident—such as the occurrence of a leak in the tank *j*—I have provided a safety-tube, *t*, through which superfluous oil will escape to the ground, instead of being forced up through the wick-tubes, where
10 it would, by becoming ignited, damage or destroy the car and its contents.

I do not claim the overflow-tube *t* as new in connection with the burners of ordinary lamps, as the same is shown in patent to Merrill, No.
15 35,460, June 3, 1862; but applied in this manner it is thought to be new and useful in combination with the other parts.

The automatic tank is attached to the car, and the heater proper forms a portion of the
20 floor of the hot-air chamber *d*, to which it is attached in such a manner that only its top is exposed to the heat therein generated, and that at its lowest and coolest part. This I consider an important improvement, because the oil in
25 the lamp-tank is kept cool by a free circulation of the outside air in contact with it, and is not, as in previous arrangements, inclosed in the hot-air chamber.

The hot-air chamber *d* is attached to the under side of the car, and the floor-timbers immediately above the burners *s'* are protected by a curved metallic or non-conducting deflecting-plate *T*, as shown in Fig. 6.

In using very broad wicks it is quite necessary that they should be elevated or depressed evenly, especially as the use of the automatic feeding-tank renders it unnecessary to often reach the top of the lamp-tank for filling. To effect this I use double friction-rollers *Q*, slightly roughened and moving together in opposite
40 directions by reason of gears *S* on the ends of the spindles upon which the rollers are fastened. Their operation is clearly shown in Figs. 5, 6, and 7, *O* being the thumb-wheel for operating them.
45

The bottom of the car is ceiled or sheathed, as shown at *a'*, with any suitable material, except as regards the space above the hot-air chamber *d*, at which point only the deflector
50 *T* intervenes between the burning wicks and the floor-timbers.

It will be seen that the ceiling mentioned forms, with the floor *a''* and the floor-timbers of the car, passages or flues *C*, through which
55 heated air from the hot-air chamber may be conducted along under the floor to the ends of the car.

At the ends of the car I provide for the exit of the hot air from the flues by removing a
60 narrow flooring-plank, (or a part of a wider one,) and the air can escape freely into the car; but this I do not allow. I construct the linings *b*, Figs. 1, 2, and 3, which form additional hot-air flues *C*, whereby the contents of the
65 car are surrounded by the said hot-air currents. All the heated air passing above the floor comes

up through the spaces at the ends mentioned above, and not through openings along the sides and through the floor of the car in various places, as specified in the Letters Patent
70 and specification referred to herein, and it is not allowed to escape at the top of the end lining. From the space formed by the end lining and the end of the car the hot air passes to the side spaces formed by the side linings
75 and the sides of the car, and finally escapes into the car through the openings which are made in the boards that form the tops of the side hot-air spaces, as indicated by the dotted lines *r* in Figs. 1 and 2. Their position is also
80 indicated by *r* in Fig. 3. Its passage from the end to the side spaces is indicated by the dotted arrows *m*, and the arrows *m* show its direction after emerging from the openings *r*, having had its heat abstracted. As this heated air be-
85 comes cooler it sinks toward and into the well or standing space between the movable bin-ends *b²* and enters the registers *l*, as shown by the arrows *n*, whence, through the tubes *k*, it is conducted back to the lowest portion of the
90 hot-air chamber to be again heated and sent out through the flues *C*. This complete circulation of air is another important point in my improvement, as it avoids the admission of large quantities of very cold air from the out-
95 side to the burners, and a consequent escape from the roof and upper portions of the car of warm air. By again heating the air that is not very cool I economize fuel and keep up a much more rapid circulation; in fact, by this
100 plan it is possible to effect the same result with a smaller heater.

For the admission of so much outside air as is necessary for combustion, and for keeping the air within the car sufficiently pure,
105 tubes *O' O'*, Figs. 2, 4, and 5, are provided and pass through the body of the lamp-tank and open into the hot-air chamber, their vertical extent being indicated by dotted lines in Fig. 4. Passing through the lamp-tank, as they do,
110 they are surrounded by the oil and aid materially in keeping it cool.

It will be understood by reference to the drawing that the linings *b b* are sufficiently furred out or removed from the studding to
115 permit a free circulation of air.

Thermometers are placed in the car at proper places, and the temperature within may be observed by opening small doors in the side of the car. Neither the thermometers nor the
120 doors are shown, and they are not claimed as new alone or in combination.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent the following:
125

1. In combination with a stove or heater placed under the body of a car, the flues or passages beneath the floor, and the air-spaces at the ends of the car, adapted, as described, to discharge the heated air into the perforated
130 air-spaces at the sides of the car, substantially as shown and described.

2. In combination with a stove or heater placed under the body of the car, and provided with the safety-tube *t* for the purpose specified, the flues or passages beneath the floor, and the
5 air-spaces at the ends of the car, adapted to discharge the heated air into the air-spaces at the sides of the car, substantially as shown and described.

3. In the stove or heater placed under the
10 body of the car, and provided with the safety-tube *t* for the purpose specified, the tubes *O'*, passing through the oil-chamber in the heater for the purpose of supplying fresh air and keeping the oil cool.

15 4. In combination with a stove or heater for burning liquid fuel, supplied automatically by a tank, *j*, said tank operated by atmospheric pressure in the manner set forth, the flues or passages beneath the floor, the closed air-
20 spaces at the ends, and the open air-spaces at the sides of the car, all connected and operating substantially as described.

5. The stove or heater *e*, arranged to form the floor of the hot-air chamber *d*, and the au-
25 tomatic tank *j*, having tubes 3 and 4 and stopper 2, constructed and operating together, as described, in combination with the flues beneath and the air-spaces at the ends and sides of the car, and the openings *r* for producing hot-
30 air currents and conducting the same to the inside of the car, substantially in the manner and for the purpose described.

6. A heater for burning liquid fuel, attached to a vehicle, and provided with a safety-tube
35 for the overflow of superfluous fuel.

7. The stove or heater so placed under the car that its top surface forms the floor of a hot-air chamber, and provided with tubes *O'*,
40 passing through the oil-chamber in the heater for the purpose of supplying fresh air and keeping the oil cool.

8. The stove or heater so placed beneath the car that its top surface forms the floor of a hot-air chamber, and provided with tubes *O'*,
45 passing through the oil-chamber in the heater for the purpose specified, in combination with the pipes *k*, which supply air to the hot-air chamber from the inside of the car, substantially in the manner described.

50 9. The heater, in combination with the flues *C*, registers *l*, and pipes *k*, for effecting complete circulation of air in a car or other vehicle.

10. The stove or heater placed under the car in such a manner that its top surface forms the
55 floor of a hot-air chamber, and provided with tubes *O'*, passing through the oil-chamber in the heater, for the purpose described, in combination with the flues beneath the floor, the air-spaces at the end, and the air-spaces at the
60 sides of the car.

11. The combination of the pipes or return-flues *k* and a stove or heater for burning liquid fuel, placed beneath the body of a car and provided with a safety-tube, *t*, substantially
65 as described.

12. The combination of the pipes or return-

flues *k*, a stove or heater placed under the body of a car, and the hot-air flues *C*, substantially as described.

13. The stove or heater placed under the
70 body of a car in such a manner that its top surface forms the floor of a hot-air chamber, in combination with the hot-air passages or flues beneath the floor of the car, the closed air-spaces at the ends, the open air-spaces at
75 the sides of the car, and the pipes or return-flues *k*, substantially as described.

14. In combination with a stove or heater for burning liquid fuel, supplied automatically by a tank, *j*, said tank operated by atmospheric
80 pressure in the manner set forth, the flues or passages beneath the floor, the closed air-spaces at the ends, the open air spaces at the sides of the car, and the pipes or return-flues *k*, all connected and operating in the manner described.
85

15. The combination of the stove or heater, provided with the tubes *O'*, which pass through the oil in the heater for the purposes described, the hot-air passages or flues beneath the floor
90 of the car, and the closed air-spaces at the ends, adapted to discharge the hot air into the open air-spaces at the sides of the car, for the purpose described.

16. The combination of the stove or heater provided with the tubes *O'*, which pass through
95 the oil in the heater for the purposes described, the hot-air passages or flues beneath the floor of the car, the closed air-spaces at the ends, adapted to discharge the hot air into the open air-spaces at the sides of the car, and the pipes
100 or return-flues *k*, all operating in the manner and for the purpose described.

17. The combination of the stove or heater provided with the tubes *O'*, which pass through
105 the oil in the heater for the purposes described, and also provided with the safety-tube *t*, for the purpose specified, the hot-air passages or flues beneath the floor, the closed air-spaces at the ends, and the open air-spaces at the sides
110 of the car, for the purpose specified.

18. The combination of the stove or heater provided with the tubes *O'*, which pass through
115 the oil in the heater for the purposes described, and also provided with the safety-tube *t*, for the purpose specified, the hot-air passages or flues beneath the floor, the closed air-spaces at the ends, the open air-spaces at the sides of the car, and the pipes or return-flues *k*, all operating
120 substantially as described, and for the purposes specified.

19. The stove or heater for burning liquid fuel, placed beneath the body of a car in such a manner that its top surface forms the floor of a hot-air chamber, and provided with the
125 safety-tube *t*, for the purpose specified, in combination with the hot-air passages or flues beneath the floor, the closed air-spaces at the ends, the open air-spaces at the sides of the car, and the pipes or return-flues *k*, substantially as described, and for the purpose speci-
130 fied.

20. In combination with the stove or heater

for burning liquid fuel, supplied automatically
by a tank, *j*, said tank operated by atmospheric
pressure in the manner set forth, and furnished
with the safety-tube *t*, for the purpose speci-
5 fied, the hot-air passages or flues beneath the
floor, the closed air-spaces at the ends, and the
open air-spaces at the sides of the car, for the
purposes specified.

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

WILLIAM E. EASTMAN.

Witnesses:

W. FREDERICK KIMBALL,
J. W. KEITH.