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D. R. BOWKER.

GRAIN STORAGE WAREHOUSE.

No. 508,561. Patented Nov. 14, 1893.

Fig. 1.

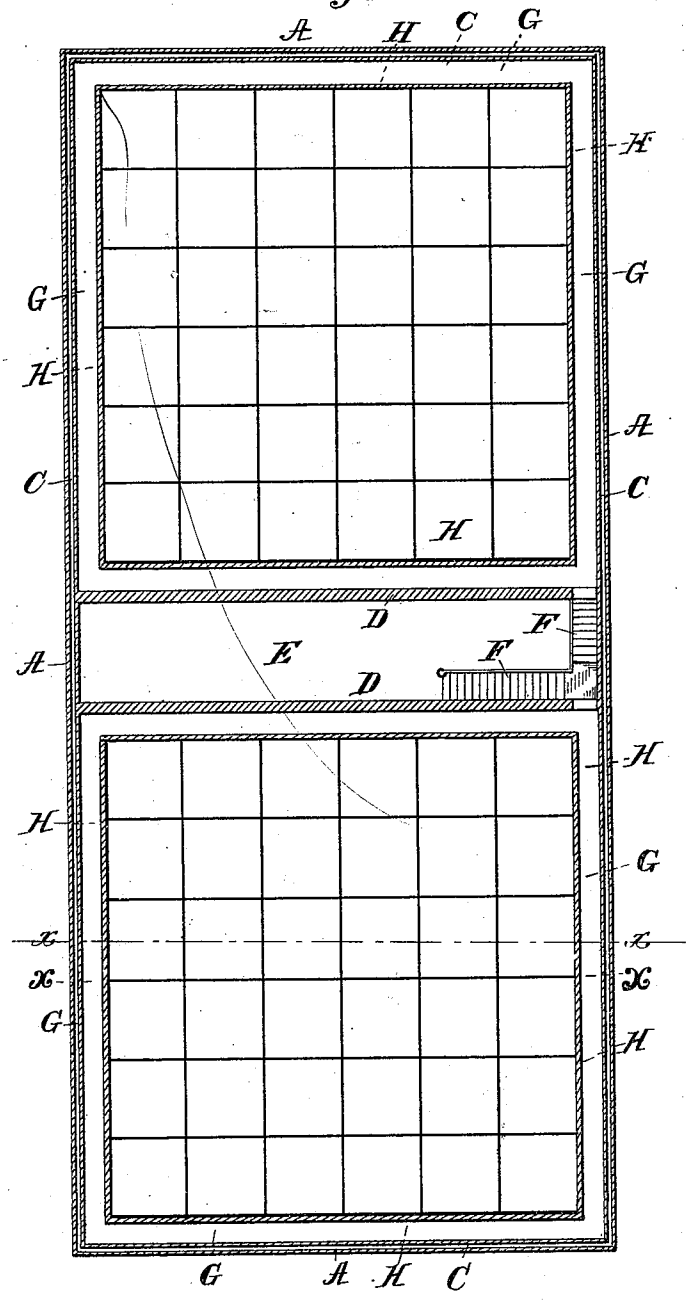

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Fig. 2.

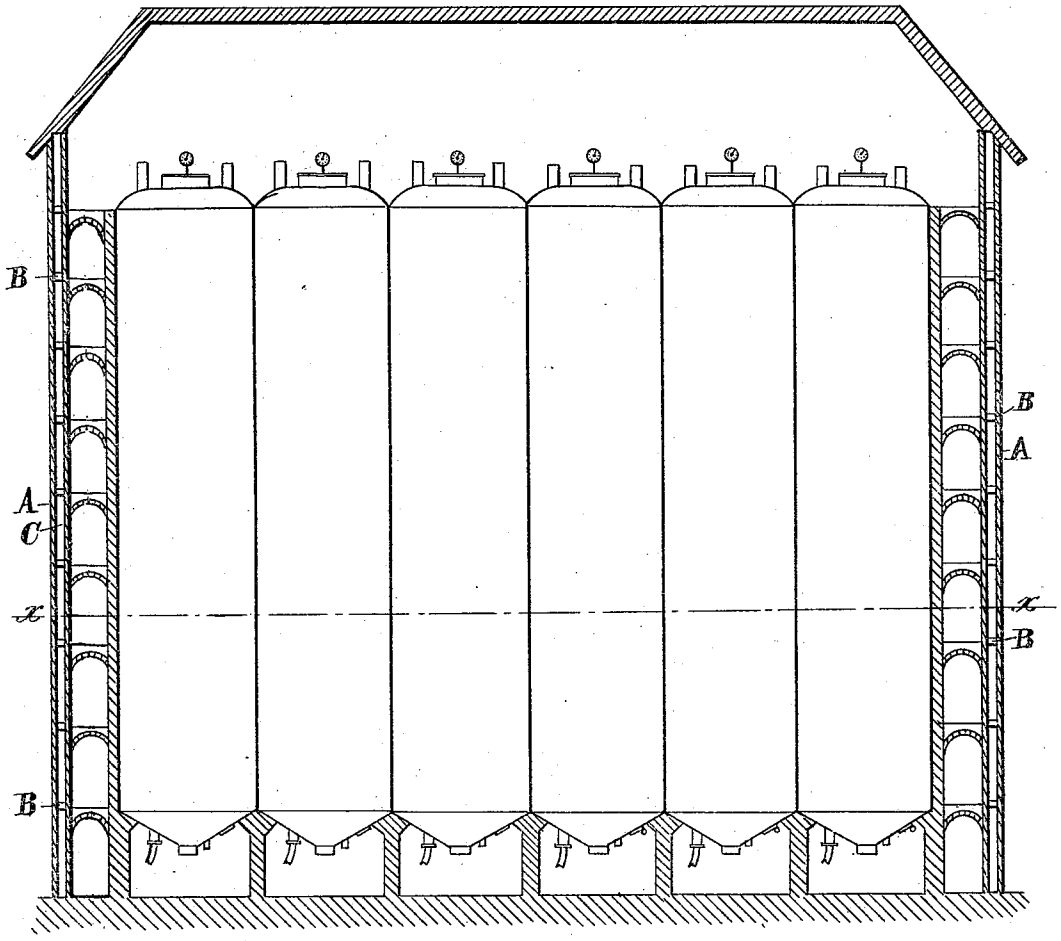
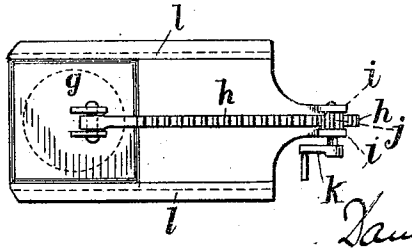


Fig. 7



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GRAIN STORAGE WAREHOUSE.

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Fig. 3.

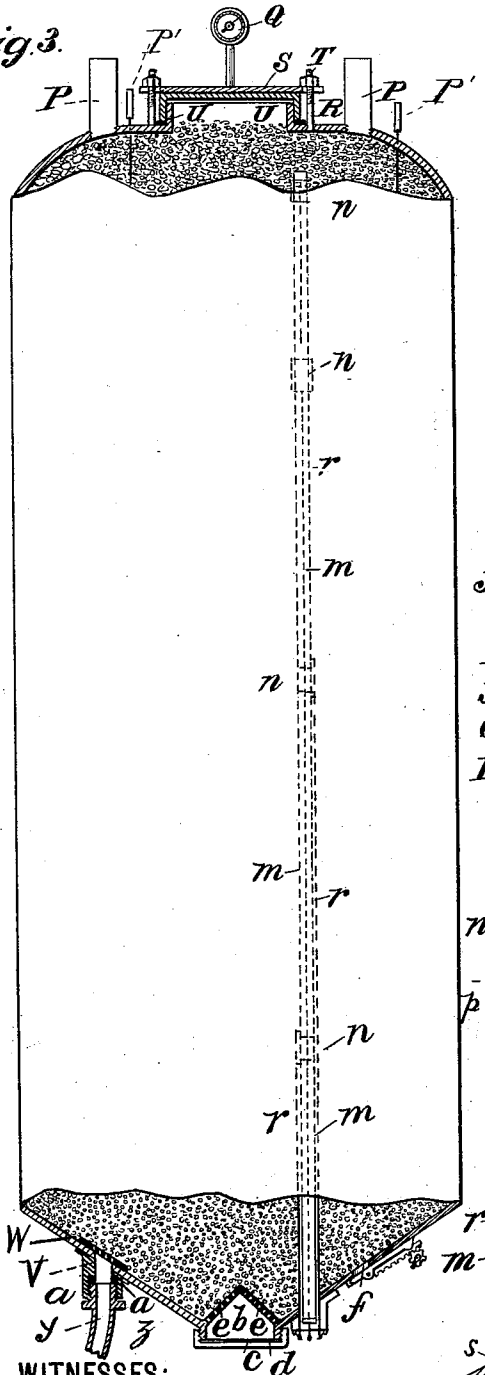

Fig. 4.

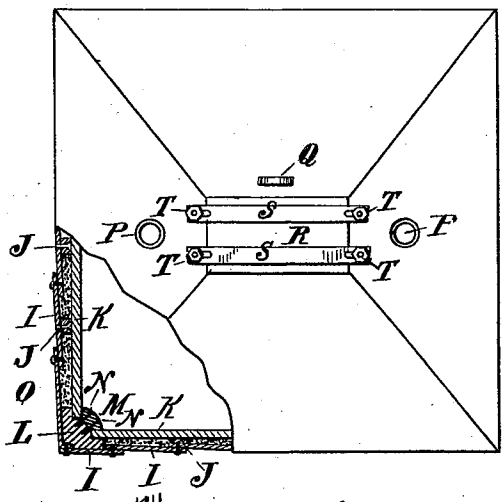

Fig. 5

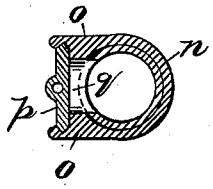

Fig. 6.

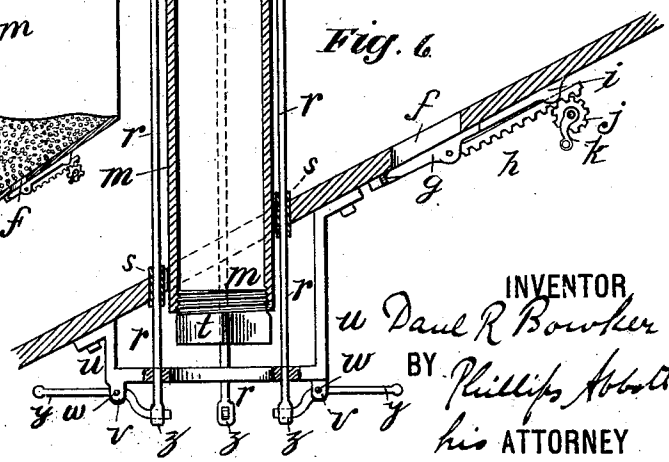

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FIG. 8.

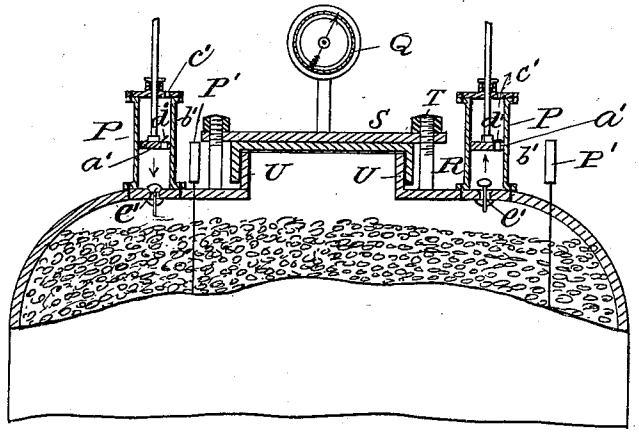
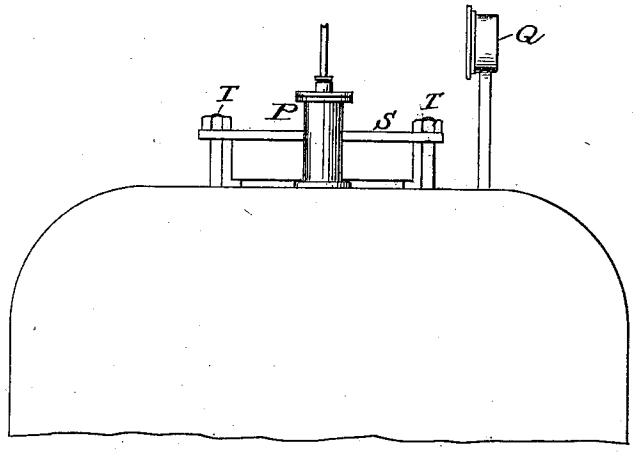


FIG. 9.



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UNITED STATES PATENT OFFICE.

DANIEL R. BOWKER, OF BROOKLYN, NEW YORK.

GRAIN-STORAGE WAREHOUSE.

SPECIFICATION forming part of Letters Patent No. 508,561, dated November 14, 1893.

Application filed September 23, 1892. Serial No. 446,684. (No model.)

To all whom it may concern:

Be it known that I, DANIEL R. BOWKER, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Grain-Storage Warehouse, of which the following is a specification.

My invention relates to a new and improved structure or warehouse for the storage of grain, and it consists in the peculiar construction and arrangement of the walls, floors, bins, &c., hereinafter set forth and pointed out in the claims.

It will be noticed that the advantages which I secure by the peculiar construction of my ware-house, are very important and valuable. That is to say; the outer wall affords protection against fire in surrounding buildings, and even if the outer wall should be entirely destroyed, nevertheless, the bins would stand, and the contents would be uninjured. Also the outer wall prevents moisture getting to the inner wall. The presence of the air chamber in the inner wall prevents sweating of that wall, it being well-known that a large or heavy body of masonry not ventilated will sweat by itself, and the galleries between the walls enable the watchman to frequently circulate around the building and observe the condition of things at the height of every gallery. Also the galleries are necessary for the purpose of repair and to open windows and other ventilating devices in the exterior walls of the building. The windows or other ventilating arrangement in the exterior walls allow free circulation of air currents to dry the inner wall, and also the gallery spaces so that mold, mildew, dampness, &c., are avoided. Also, should a fire arise, these galleries permit the firemen to attain any desired height with their fire appliances to project the water through the windows, &c., in the outer wall, to suppress fires in adjoining buildings, on any side of the ware-house, and at any desired height. Thus there is a co-active relation between all of the stated features. The inner wall, primarily supports the building, and the air chamber in it prevents its sweating. The outer wall additionally strengthens the building and prevents fire from destroying the structure; all the destructive effects of fire in adjoining buildings, being received upon the outer wall, which, even, if entirely destroyed, would not destroy the building, but, could after the fire, be replaced; and the galleries, at whatever heights from the bottom to the top of the building, permit constant inspection at any desired elevation, of the entire structure, and also afford means for opening ventilators in the outer wall, and in the interior of the building, and by passage through them, the watchman can observe every part of the ware-house.

In the drawings hereof, Figure 1. is a plan view in section on the line x, x, of Fig. 2. Fig. 2. is an elevation in vertical section on the line x, x, of Fig. 1. Fig. 3. is a view partly in section and partly in elevation of one of the grain bins. Fig. 4. is a view partly in section and partly in plan of the upper part of one of the grain bins. Fig. 5. is a vertical detail on a horizontal line of one of the testing valves. Fig. 6. is a vertical sectional view of the lower part of the sampling tube and co-acting parts. Fig. 7. is a detail in elevation of one of the gates through which the grain is withdrawn from the several bins. Fig. 8 is a vertical section of the upper part of one of the bins, showing the exhaust pumps. Fig. 9 is an elevation of the side of the vacuum gage and of the tank in elevation.

Referring first to Figs. 1 and 2, A, A, represents the exterior wall of the building. It is made double as shown, that is to say, having an air space C, C, between the two thicknesses of the wall, the two walls being tied together here and there as required architecturally by stays B, B, (see Fig. 2.) D, D, are two solid walls running across about midway of the length of the building, and they divide it into two parts so that the spread of fire, should any occur, from one portion of the building to the other portion, will be practically impossible, there being iron doors or other suitable fire excluding devices, placed at all doorways as hereinafter explained. E, is a space or room which extends from the bottom of the building to the top. On the basement floor of the building are located the engines and other appliances for carrying on the work of the building. In this space, E, are also arranged stairways F, which extend from floor to floor throughout the height of the building, there being no other stairways

in the building. Within the external walls, A, and separated from them by a hall-way, G, which extends all around the building at each floor, is placed the grain holders proper H. The entire space within these walls H, is divided into a number of grain bins preferably square in shape. I prefer them to be made of boiler plate, and if of boiler plate or of brick, in order that there may be no condensation, I prefer to construct them as shown in Fig. 4. That is to say, the boiler plates I, I, are riveted together as shown, and here and there are arranged vertical timber strips J, which are of differing thicknesses as shown, so that their inner faces are all upon the same line. They are fastened by bolts or screws or otherwise to the boiler plates, and along their inner faces are arranged boarding or planking K, preferably of matched stuff. At the corners of each bin are arranged rectangular pieces of timber L, having clamp pieces M on their inner sides between which and the pieces L the ends of the planking or boarding K are clamped, and securely held as shown in Fig. 4. Bolts or spikes N serve to fasten the pieces M to the pieces L, and to hold the ends of the boarding between them. The metal boiler plates are riveted together at the corners in any preferred manner, and the space between the boarding K and boiler plates is preferably filled with a cement or plaster like body, O. Any substance used for filling safes, refrigerators, refrigerating cars and the like may be used instead of the cement or plaster. In this way I prevent the cold from the iron acting to condense such moisture as may be in the grain which would engender molding, musting or growth in it. Of course it will be understood that both sides of the boiler plates are protected in this manner, although I show it in one side only in Fig. 4.

Referring to Figs. 3 and 8 P, P, represent two exhaust pumps. One only may suffice for each bin. a' are the pistons of the pumps, b' the cylinders, c' the openings in the upper end of the cylinders through which the air escapes, d' the valves in the pistons and e', the valves in the lower part of the cylinders which connect with the interior of the bin; the valves d' and e' are each provided with the usual gravity acting devices or valves which close the valve openings during the making of the stroke as understood. These exhaust pumps at the proper time exhaust the air from the bins, they, (the bins) being made air tight or as nearly so as possible at all of their joints and also all openings in them are sealed as hereinafter stated. The exhaust pumps may be run by steam or other suitable power in a well-known manner. Q, is a vacuum gage one of them being applied on each bin (see Figs. 3 and 9.) These gages are of the usual construction. They not only show the degree of vacuum attained by the pumps but also indicate a leakage in a well-known manner. R is a cap or cover which is held down over the open end of each bin by cross bars S, which are held in place by bolts and nuts T, in a manner well understood. U is a gasket, or other packing beneath the lower edge of the cover whereby the air is excluded. p', p' are two grain bin thermometers, constructed and arranged in a manner well known to register the temperature of the grain at various parts of each bin; I may employ more or less than two of them disposed as preferred.

Referring now to Fig. 3, V is an air inlet pipe covered with a perforated metallic plate W, so that the grain cannot escape, but a blast of air may pass up through it into the grain. Y, is a pipe leading to any suitable blast device whereby hot air, as may be desired, is forced through the grain. It is supplied with a suitable stop cock Z, so that the air may be shut off from entering or exit, and it is provided with a packing a to make the joint air tight. b is another opening covered by a cap c which has a packing ring d through which a natural passage of air will be allowed of large area whereby the temperature of the grain may be maintained in a normal condition. This opening being large in area is covered with a conically arranged and consequently strong, perforated cap or hood of metal e, so that the air may pass in and out but the grain cannot. f (see Figs. 6 and 7) is an opening in the bin through which the grain is withdrawn when desired. It is covered by a sliding gate g which is pulled open and shoved shut by a rack h which is guided by guides i upon each side and is actuated by a pinion j and crank handle k all as shown. The gate g snugly fits and slides in slideways l and is ground to an air tight fit with a seat surrounding the edges of the hole f and if required any suitable material such as soft metal or other packing may be employed between the surfaces to make this joint air tight.

I refer to the use of hot air blown through the grain because it is part of my invention as a process to kiln dry the grain so that both animal and vegetable life in it will be prevented, suspended or destroyed.

In order that the grain may be sampled at any desired point in the height of each bin, I provide a tube m (see Figs. 3 and 6) which extends from the bottom to near the top of each bin. It is put together in sections and at each section there is a valve coupler n (see Fig. 5). It is so constructed that the sections of the rod m are threaded to it at each end and on one side it projects laterally forming a square slideway o in which slide valves p opposite which valves there are openings q into the interior of the tube.

r, r, are a series of rods, each of which extends from the exterior of the bin through a stuffing box s up through the grain and engages with one of the valves p. Of course some of these rods are longer than the others depending upon the elevation of the special valve with which it connects. The lower

end of the tube m projects through the bottom of the bin, and at its end there is an air-tight screw plug t which hermetically closes the end of the test tube.

u is a frame bolted to the outside of the bin provided with lugs v and cross bolt w which are removable, and y, y, are two levers one end of which engages with a socket z, z, on the ends of the rods r, and the other end of which may be extended as far as desired to serve as a handle, thus affording means to open or close the valves p, elevating and depressing the rods r as before stated.

I claim—

1. A building having an outer wall and an inner wall, the spaces between the walls having galleries extending entirely around the inner building and grain bins within the inner building, substantially as set forth.

2. A building having double outer walls, with an air space between them, inner walls, a series of galleries between the outer double walls and the inner walls, extending entirely around the building and grain bins within the inner walls, substantially as set forth.

3. A grain bin having a sampling tube extending from the exterior of its lower part, up through the grain said tube having a series of valves, opening into it within the same bin at different elevations which are operated from the exterior of the bin and a separate opening for drawing off the grain from the bin, substantially as set forth.

4. A grain bin having a sampling tube extending from the exterior of its lower part up through the grain and provided with a series of valve couplings within the bin, and valves operated by rigid rods which extend to the exterior of the bin, adapted to pull the valves open and push them shut, and a separate opening for drawing off the grain, substantially as set forth.

5. A grain bin having exhaust pumps at its upper part, a vacuum gage, means for preventing the entrance of air to the bin, a sampling tube extending from the exterior of the lower part of the bin through the grain, provided with a removable air tight cap to prevent the air from entering the bin through the sampling tube, and valves for admitting the grain to the sampling tube operated by rods from the exterior of the bin, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 4th day of March, A. D. 1891.

DANL. R. BOWKER.

Witnesses:

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