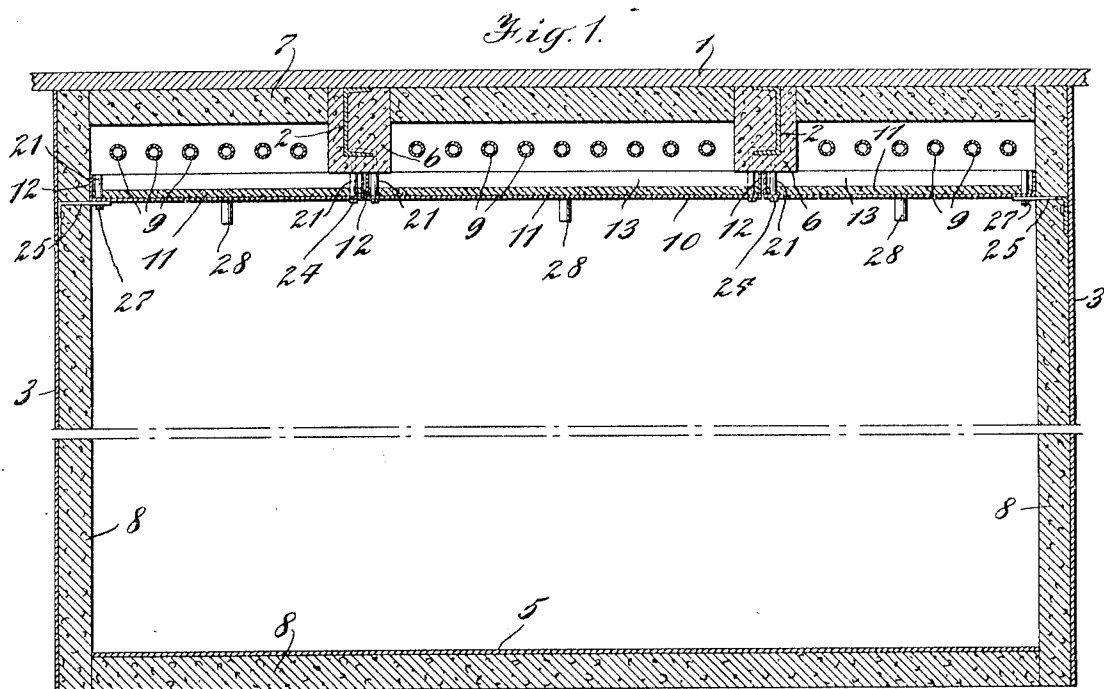
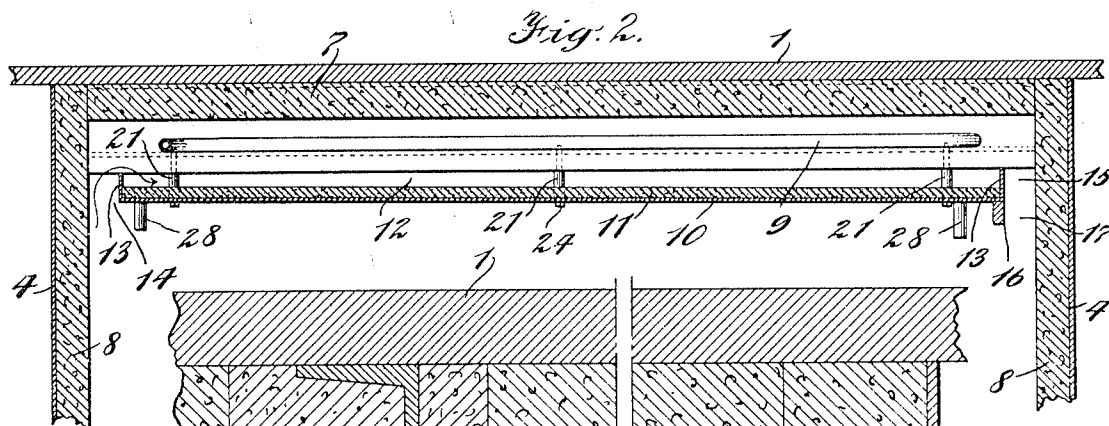
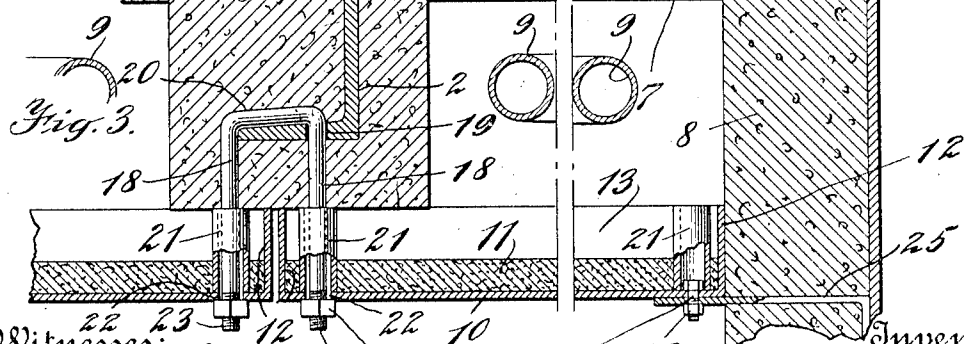


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POWDER OR EXPLOSIVE MAGAZINE FOR WAR SHIPS.
APPLICATION FILED SEPT. 3, 1912.

1,079,069.

Patented Nov. 18, 1913.



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UNITED STATES PATENT OFFICE.

JOHN EDWIN STARR, OF NEW YORK, N. Y., ASSIGNOR TO RAILWAY AND STATIONARY REFRIGERATING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

POWDER OR EXPLOSIVE MAGAZINE FOR WAR-SHIPS.

1,079,069.

Specification of Letters Patent.

Patented Nov. 18, 1913.

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To all whom it may concern:

Be it known that I, JOHN EDWIN STARR, a citizen of the United States, residing at New York city, borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Powder or Explosive Magazines for War-Ships, of which the following is a specification.

My invention relates to new and useful improvements in the powder or explosive magazines of warships, or in any such magazine where it is desirable to employ mechanical refrigeration for regulating the temperature of the magazine, the object being to produce even temperatures throughout the magazine, and to dehydrate the air in the magazine so that the air may be kept at an even and low temperature, and in a dry state.

The invention consists in the improvements to be more fully described hereinafter, and the novelty of which will be particularly pointed out and distinctly claimed.

I have fully and clearly illustrated my invention in the accompanying drawings to be taken as a part of this specification and wherein:

Figure 1 is a vertical cross-section through a magazine embodying my improvements, the same being taken on a line longitudinally of the ship; Fig. 2 is a detail sectional view of the upper part of the magazine shown in Fig. 1, but taken on a line at right angles to the section of Fig. 1; Fig. 3 is an enlarged detail sectional view of the supporting means for the drip pans.

Referring to the drawings by characters of reference and particularly to Figs. 1 and 3, 1 designates a horizontally disposed deck plate which constitutes the roof or ceiling for the magazine and 2, 2 designates the cross-beams, usually flanged or channel beams, for supporting the deck plate 1. The magazine also includes end walls 3, 3, side walls 4, 4, and a floor 5, all of metal plate. The beams 2, 2 are incased in heat insulating material 6, preferably cork, and the underside of the deck plate is covered by cork insulation 7. The side and end walls and floor of the magazine are similarly insulated by cork slabs 8, the purpose being to protect the interior of the magazine as much as possible from temperature conditions exterior thereof, so that the temperature within the magazine may be more easily maintained

uniform or at a desired temperature. The beams 2, it will be noted, project below the inner surface of the ceiling, as is apparent from Fig. 1, and are insulated with an insulation, as stated above, to prevent the conduction of the heat through contact of the beam with the iron deck, through the mass of the beam and into the magazine. The heat is conveyed from the magazine to the refrigerating machine by a non-congealable liquid, such as brine, which is circulated by suitable means through a conduit in the form of coils or grids of piping 9 placed near the ceiling of the magazine and in the spaces between the deck beams. I will now proceed to describe the means whereby the air in the magazine is caused to circulate continuously therethrough and in contact with said refrigerating pipes or grids 9, so that it is continuously dehydrated, and is maintained at the desired even degree of temperature.

Beneath the deck beams and preferably supported therefrom are placed pans 10 made of steel, each of which is insulated on the inner face of its bottom by a layer of waterproof heat insulating material 11, such as a composition of ground cork and pitch. This insulation serves an important purpose in that it prevents the pans from being chilled by the refrigerating coils 9 below the dew point of the magazine, and therefore prevents the condensation of moisture on the underside of the bottom of the pan, which condensation, if permitted, would drip down and wet the contents of the magazine.

The pans above mentioned are preferably oblong in plan view, and are provided with longitudinal upstanding side flanges 12 and end flanges 13 which retain any moisture which may be condensed on the refrigerating pipes and at any time drip therefrom. The pans are so arranged that the space between each two adjacent deck beams is bridged by a pan, and each pan is supported with its longitudinal side-flanges 12 in contact with the cork covering 7 of said deck beams throughout the length of said flanges so that the said flanges make an air and fluid-tight joint between the sides of each pan and the insulation covering of the deck beams. By this construction each pan forms, with the deck beams and the ceiling, an air duct across the upper end of the magazine. The upper edges of the longitudinal flanges of the pans are inclined lengthwise relative to the bases

of said flanges, so that when the pans are secured in place to form the air ducts, the bottom of the pans will be inclined from one end to the other, as clearly shown in Fig. 2. The pans 10 described, are preferably of a length less than the distance from wall to wall of the magazine taken lengthwise of the deck beams so that spaces 14, 15 are provided at the ends of the pans providing respectively an inlet, and an outlet to each of the air ducts formed by said pans, the lower ends of the pans being each provided with a depending flange 16 forming with the adjacent wall of the magazine an outlet or 15 downtake passage 17, which with the incline of the pan facilitates the movement of the air through the air ducts.

The insulated ceiling of the magazine, the insulated sides of the beam and the removable pan placed below the beams, as shown in Fig. 1, form air ducts, as above stated, for the passage of air from one end of the magazine through said ducts, in which the cooling coils are located, to the other end of the magazine, and then down through said 25 downtake 17 formed by the end of the pan and the end wall of the magazine, so that the air sweeps down through the magazine, thus creating a gentle but continuous current of air and maintaining a substantially even or constant degree of temperature throughout the magazine. This flow of the air is facilitated by the reason of the inclined bottoms of the pans because the air, 35 in becoming chilled by the cooling pipes, is increased in density so that it flows down the inclined bottoms of the pans into the magazine, thereby inducing a current of air at the inlets of the ducts formed by said 40 pans.

The pans may be secured in place in any suitable manner, preferably so that a tight joint will be formed between the side flanges of the pans and the beams 2. The means employed consists of U-bolts, the legs 18 of which depend from the beams, one leg of each bolt being passed down through an opening 19 in the flange of the deck beam, and the other leg being passed outside the 50 edge of said flange as shown, so that each of the bolts is suspended by the portion 20 thereof connecting said legs bridged over the flange of the deck beam. One leg of each of said U-bolts passes down through a vertical tube 21 secured within the pan adjacent the side flanges thereof, the lower end of the tube being brazed to the bottom of the pan so as to provide a moisture-proof joint between the tube and the pan. The 60 lower end of the tube opens through a hole 22 in the bottom of the pan, and when in place the lower threaded end 23 of the bolt passes through said hole and projects below the bottom of the pan where it carries a nut 65 24. By screwing the nut up on the bolt the

pan is moved toward the deck beams and the flanges 12 and upper ends of the tube 21 moved positively against the insulation of the deck beam so as to form a fluid-tight joint therewith. It will be noted upon examination of Figs. 1 and 3 of the drawings that each U-bolt serves to support the adjacent edges of the adjoining pans. The edges of the pans which abut the side walls of the magazines where there is no deck beam are supported by brackets 25 embedded in the insulation and secured to the iron wall or plate of the side wall and projecting horizontally into the magazine, upon which bracket the edge portion of the bottom of the pan rests and is supported, being secured to the bracket by a headed bolt 26 let down through a tube 21 as heretofore described and said bracket and secured by a nut 27 on its lower threaded end. The pans may each be provided at their opposite ends with drain openings and pipes 28 leading to any suitable point outside the magazine so that any water which may be deposited in the pans can flow away without being thrown into the magazine and wet the contents thereof. The pipes 28 are located at both ends of the pans so that the pans will be properly drained at all times irrespective of the pitch and roll of the ship. 70 75 80 85 90 95

It will be apparent that by the above described arrangement I make use of the space between the deck beams which has hitherto been waste space because it is of no value as storage space for ammunition. 100

When the system is operating the proper refrigerant is caused to flow through the coils 9 to make the air in the magazine of the desired temperature. The cool pipes within the air ducts make the air in said ducts more dense than that in the free space of the magazine which results in the more dense air passing through the ducts and down the downtakes 17 into the magazine, the flow of the air being facilitated by the inclination of the bottoms of the pans. This flow of the air from the ducts induces a flow from the free space of the room through the inlets 14 into the pans, which results in a continuous and gentle flow of air from the magazine through the air ducts in which ducts it is attemperated and dehydrated so that when it passes into the magazine it is of the proper temperature, which is maintained even, and is dehydrated so that there is substantially no moisture to come into contact with the ammunition and injure the latter. By proper regulation of the flow and supply of the refrigerant to the coils 9 the temperature in the magazine may be maintained substantially constant at any temperature desired. During operation of the system, should frost form on the coils 9, or water of condensation form on said pipes, there is no danger of drippings falling 130

therefrom into the magazine, as such drippings will be caught by the pans and conveyed from the magazine by means of the drain pipes 28. It will be seen that the pans 10, therefore, have two functions, namely, to form air ducts in conjunction with the ceiling and deck beams, and to catch any drippings which may fall from the refrigerating coils.

10 I desire it understood that by the use of the terms "coils," "grids," "pipes" or "conduits" used as descriptive of the element 9 I do not desire to limit myself to any particular means for circulating the refrigerant in the air ducts, as this feature of the invention is not limited to any particular construction of the circulating means.

What I claim and desire to secure by Letters Patent of the United States is:—

20 1. In a magazine, in combination with the ceiling and the ceiling beams of a refrigerating conduit between the said beams and adjacent the ceiling, a pan bridging the space between the said beams, said pan having an air inlet and an air outlet at its respective ends, and having its bottom protected by heat insulation.

2. In a magazine, in combination with the ceiling and the ceiling beams, of a refrigerating conduit between the said beams and adjacent the ceiling, a pan bridging the space between the said beams and making fluid-tight joint with said beams, said pan having an air inlet and an air outlet at its respective ends, and having its bottom protected by heat insulation.

3. In a magazine, in combination with the ceiling and the ceiling beams, of a refrigerating conduit between the said beams and adjacent the ceiling, a pan bridging the space between the said beams, said pan having an air inlet and an air outlet at its respective ends, and having its bottom inclined downward from the said inlet toward the said outlet and protected by heat insulation.

4. In a magazine, in combination with the ceiling and the ceiling beams, of a refrigerating conduit between the beams and adjacent the ceiling, a pan bridging the space between the beams and having longitudinal flanges making fluid-tight joint with said beams, said pan being provided at its respective ends with an air inlet and outlet.

5. In a magazine, in combination with the ceiling and the ceiling beams, of a refrigerating conduit between the beams and adjacent the ceiling, a pan bridging the space between the beams and having longitudinal flanges making fluid-tight joint with said

beams, said pan being provided at its respective ends with an air inlet and outlet and having its bottom inclined downward from the inlet toward the outlet.

6. In a magazine, in combination with the ceiling and the ceiling beams, of a refrigerating conduit between the beams and adjacent the ceiling, a pan bridging the space between the beams and having longitudinal flanges making fluid-tight joint with said beams, the upper edges of said flanges being inclined from one end to the other whereby the bottom of the pan is inclined when the pan is in position, said pan having an air inlet at its upper end and an air outlet at its lower end.

7. In a magazine, in combination with the ceiling and the ceiling beams, a pan bridging the space between the beams and forming an air duct in conjunction therewith and with the ceiling, a refrigerating conduit in the said air duct, and an air inlet and outlet from said duct.

8. In a magazine, in combination with the ceiling and the ceiling beams, a pan bridging the space between the beams and forming an air duct in conjunction therewith and with the ceiling, a refrigerating conduit in the said air duct, and an air inlet and outlet from said duct, said pan having the entire inner surface of its bottom covered by heat insulating material.

9. In a magazine, in combination with the ceiling and the ceiling beams, a pan bridging the space between the beams and forming an air duct in conjunction therewith and with the ceiling, a refrigerating conduit in the said air duct, and an air inlet and outlet from said duct, said pan having its bottom inclined from the inlet toward the outlet and entirely covered by heat insulating material.

10. In a magazine, in combination with the ceiling and the ceiling beams, of pans bridging the spaces between the beams and forming air ducts in conjunction with said beams and ceiling, the side edges of adjacent pans forming a fluid-tight joint with one of said beams, a U-bolt passing through said beams and the pans, and tubes in the pans and surrounding the U-bolt members, and having fluid-tight joints with the pans, and refrigerating conduits in said air ducts.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN EDWIN STARR.

Witnesses:

M. E. McNinch,
C. G. Heylmun.