

July 2, 1929.

A. WATHEY

1,719,151

VAULT HEAD

Filed Feb. 18, 1928

FIG. 1

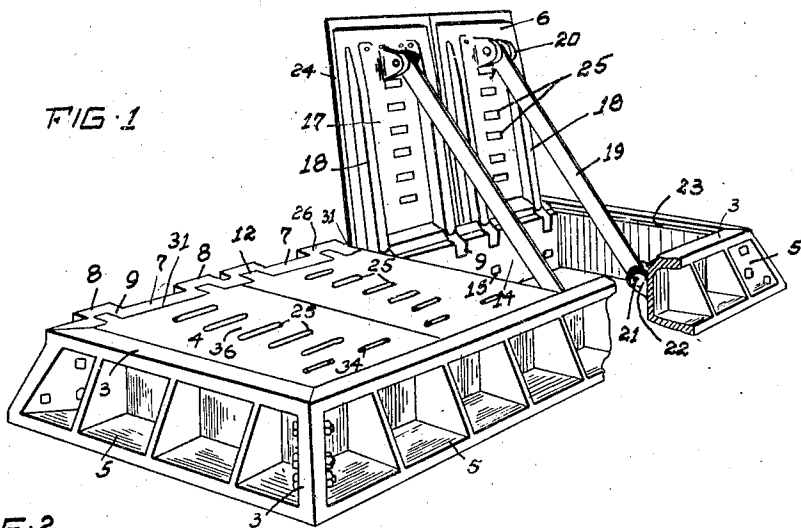


FIG. 2

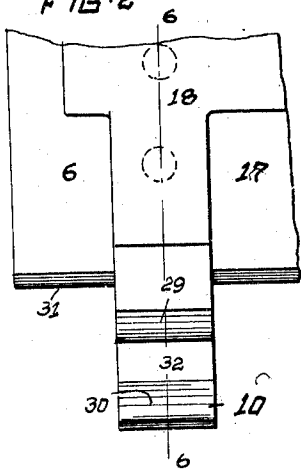


FIG. 3

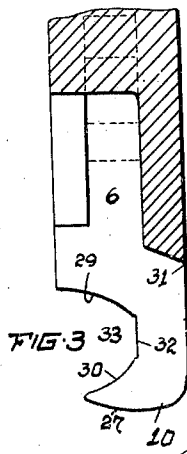


FIG. 5

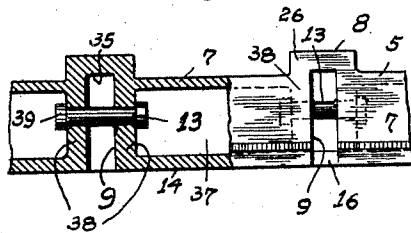


FIG. 6

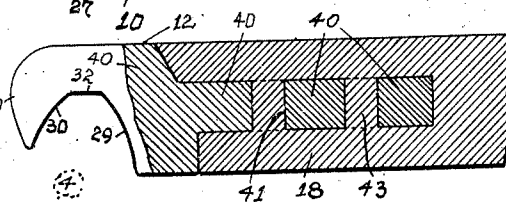
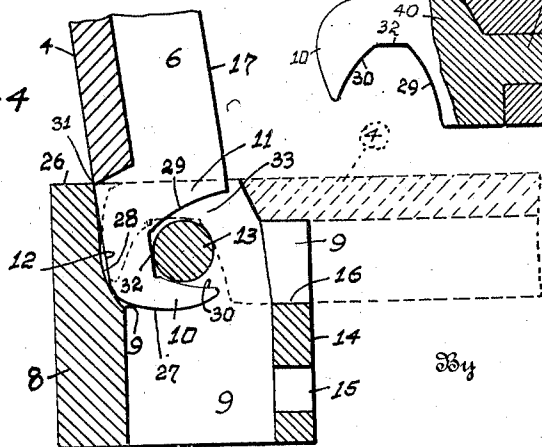


FIG. 4



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VAULT HEAD.

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This invention relates to vault heads, and more especially to composite vault heads in which a single main frame is provided with a plurality of independently-swinging covers all of which may be closed at one time, but the several covers capable of being opened separately, and one or more of them remain open for a long period if it is desired, while the others may be closed. It is a particular object of my invention to provide such a vault head which shall open a relatively large area or space leading downward into the manhole below, which shall include cover units hinged to the frame so as to permit safe positioning of the covers in their open position without provision of extraneous means of holding them in an inclined position, and which head shall present a smooth and tight external surface when the covers are closed.

Another object of my invention is to provide hinge connection of the covers with the main frame which though forming exceedingly strong connection of the parts while the covers are raised to open position or even to partly open position, shall make a readily detachable connection when the covers are closed. This has hitherto been difficult of accomplishment in the same structure. Either, the hinge connection has not been sufficiently strong, as heretofore constructed, or the cover has been non-detachable when closed.

Still another object of my invention lies in the arrangement of the hinge parts connecting the covers with the main frame of the vault, so that the hinge pintle shall be exposed only at the parts thereof that are directly engaged by the swinging elements. This arrangement provides for holding the hinge parts in close contact at all times, so that liquids may not cover the exposed parts while the covers are open, and as a result permit freezing the same on the covered surfaces and making difficult the closing of the covers.

With these and other objects in view my invention consists of certain features of construction hereinafter described, recited in the appended claims and illustrated in the accompanying drawings wherein—

Figure 1 is a perspective view of a vault head of four sections two of which are open; parts being broken away;

Figure 2 is an inverted plan view of a hinge part of a cover member;

Figure 3 is a detail sectional view of the same;

Figure 4 is a detail sectional view of the

hinge structure of my improved vault head showing the cover section raised in full lines, and closed in dotted lines, the plane of the section being transverse of the hinge pintle;

Figure 5 is a detail view of the hinge portion of a frame section, portion being in plan, and the remaining portion being broken away to show a horizontal section, and

Figure 6 is a detail, longitudinal section of the hook member, taken on the line 6—6 of Figure 2.

Since my vault head is intended as one of large capacity, I have divided its structure into detachable parts for the purpose of making transportation and installation of the same more easily accomplished, and still result in the final product being strong and durable. The main frame is designated by the numeral 5 which is of general rectangular outline having its corners 3 bolted together so that the ends and sides of the frame are detachable. The assembled main frame may be formed of cast metal—usually iron, intended to enclose the opening in a street or other pavement and provided with a cut-out inner edge or shelf 23 for receiving the cover thereon in its closed position. The structure is adapted to receive masonry, such as concrete or asphalt paving about its edges up to and even with the surface of the closed cover.

In a vault cover of such capacity, it is desirable to provide a plurality of iron covers 6 swinging on aligned hinge pintles, though it may be desirable that certain of the covers shall slightly overlap the cover adjacent one side. In any case, the edges 24 of the end cover sections will tightly fit the cutout edge 23 of the frame. The structure of the two ends and one of the sides of the frame, is very much similar in external appearance, but the back wall 7 embodying the hinge of the structure therein, will be somewhat modified. The exterior outline of the wall 7 is somewhat irregular, it being provided with extended iron protuberances or posts 8 which, though integral with the main wall 7, are intended to provide exceedingly strong upper surfaces 26 upon which the rear edges of the covers may rest in their open and inclined position.

The posts 8 serve the further purpose of providing hinge construction particularly suitable for protecting the hinge in both the open and closed position of the cover. The hinge wall 7 is made hollow by the provision of an integral inner wall 14 parallel therewith and forming a cavity 37 between these two

walls. The posts 8, however, are hollow having inner parallel walls 38 integral with the walls 7 and 14 the entire structure being cast together. This results in the cavity 9 in each post having an upper opening to receive therein extending hooks 10 from the covers 6. This cavity 9 serves well the purpose of protecting the hinged structure, both from freezing liquids that otherwise might flow into the cavity, and from possible fracture from outside bodies. A hinge pintle 13, usually of steel, is molded in the walls 38 of each cavity 9, the ends of the pintle piercing said walls and strengthened in its position by enlarged ends 39. The upper edges 16 of the wall 14, at the entrance to the cavity 9, as shown in Figs. 1, 4 and 5, serves to support the hinge end of the cover when in its lower position, as shown in the dotted line position in Fig. 4.

Each cover 6 has a flat outer surface 4, ventilating openings 25 and handles 34 loosely secured in openings in the cover but provided with means on their inner ends to prevent detachment, though permitting lifting somewhat for the purpose of opening the cover. No protection is asked for this feature. The hinge extensions or hooks 10 of the covers extend out beyond the edge of the covers, have a flat upper surface 12, and have a thickness exactly equal to the distance between the walls 38 of the cavity 9. This results in a uniform upper surface of the surfaces 4, 12 and 26 when the covers are closed. Since these iron cover sections are very heavy, provision is made for strengthening them by reinforce portions 18 on the lower surface 17 of the cover, the hook members 10 being formed of steel parts 40 for strength, and cast in the reinforce portions 18, by having cross apertures 41 therethrough for receiving the gray iron 43 when molded, and thereby locking the hooks 10 integrally in the reinforce. The surface 12 of the steel hooks is exposed on a surface uniform with the iron surfaces 4 and 26, so that the steel surface can hardly be differentiated from the iron of the cover. This structure, however, provides a strong hinge connection between the steel hooks 10 and the steel pintles 13, the whole being connected to the cover by the cast-in assemblage of the parts 40 in the parts 18.

The structure of the steel hinge part 10 is of great importance, and its great strength is enhanced by suitable curves and angles that the part 10 may be inserted in the cavity 9 between the steel pintle 13 and the rear arch-shaped surface 28 of the rear wall, this insertion being made possible while the cover section is in horizontal position. It will be noted from the showing in Fig. 4 that, since the outer surface 27 of the hooked end corresponds to the curve 28 of the wall, there will be little movement of the cover toward or from the steel pintle 13, while the cover is being opened or closed, as the curves 27 and

28 will direct the rocking action of the steel part 10 on the steel pintle.

Spaced from the steel hook 10 is the support extension 11 which is substantially parallel with the reinforce 18. This construction results in a notch 33 between the parts 10 and 11 which is occupied by the pintle. The inner surface of this notch is formed of concave surfaces 29 and 30 whose inner edges are spaced by a flat surface 32 which is substantially parallel with the external surface 12. On either side of the extension 10, the covers have a straight edge 31 which, when the covers are inclined as in Fig. 1, rest upon the surfaces of the posts 8, as at 26.

In this position, the covers are retained until they are forcibly closed by pressure applied against their upper surfaces. It is evident that the weight of the covers in their open position, rests wholly upon this edge 31, and that the tendency to rock to a greater inclination is overcome by the pressure of the surfaces 30 and 32 exerted upwardly against the pintle. This pressure upon the surface 31 is not relieved until the cover is swung forward sufficiently to permit the surfaces 29 or 32 to rest upon the pintle. The edge 31 then no longer bears against the surface 26. This structure is very carefully planned to permit the raising of the covers 6 while in a horizontal position, directly upward, but prevent detachment of the cover while it is inclined as shown in full lines in Fig. 4. This structure further insures a tight fit of the hinge parts and of the frame and cover when the latter is closed.

I have shown in Fig. 1 certain cutting bars 19 which are rather slender but of sufficient strength to bear a force exerted against their edges as there shown, by large masses of snow and ice which are apt to be formed by street cleaning machines used on the streets of cities and towns, and which ordinarily cannot readily be disposed of, especially not by forcing them into sewers. These blades 19 are normally hinged to pairs of lugs 20 borne by the inner surface of the cover as illustrated, and the lower ends pivoted upon a removable pin 21 inserted in the lugs 22 on the inside of the main frame. The pins 21 are removed when the covers are to be closed, then permitting the blades 19 to be suspended from the lugs 20 in the main opening. These blades 19 are not intended to bear the weight of the covers when they are inclined in the open position, but will serve to cut such snow masses as are forced against them while all or part of the covers are open. The mass will then fall into the opening in the frame, in short masses resulting from the division of the large mass by these blades. Usually the force exerted in driving the snow mass against the blades is sufficient to divide it, and additional pressure can easily be used from above if it is necessary. In any case, the blades will be sup-

ported by the lugs 20 and 22, the final pressure being exerted on the main frame.

As many of the openings 25 are provided as are desirable for ventilation purposes, though the mass of iron 36 between the openings of each pair serves well another purpose as will now be explained. When it is desired to lift a cover plate 6 bodily upward from the frame, it is quite feasible to move a truck with a suitable crane up to the vault with the crane directly above the plate. A light chain from the reel can then be readily looped about a central mass 36 by passing it through the openings 25, so that by actuating the reel, the cover plate can be readily lifted off and moved away. This may be desirable in replacing a broken plate. It is also desirable in lowering a plate into position for any purpose.

It is regarded as a special function of my structure that liquids shall not freeze about the hinge parts and thereby make difficult the opening and closing of the covers. The mounting of the pintles 13 in the upper portion of the cavity 9 serves this purpose well by permitting liquids from the street to flow down in this cavity and not form masses of ice about the pintles. To further this result, openings 15 are provided in the wall 14 on a lower plane than the pintles, thus permitting liquid to flow from the cavities 9 inward and down in the opening in the center of the frame. The pressure of the open covers upon the edge 31 against the surfaces 26 tends to prevent flow of liquid into the open frame from the side 7 thereof, as shown in Fig. 4. In the closed position of Fig. 1, the edge 31 fits tightly the surface of the wall 7, and the surface 12 of the steel hook 10 fits closely the upper opening of the cavity 9. Thus the common surface of the cover plates and frame is uniform when closed, and the hinge is protected when the covers are open.

Operation.—Assuming that the vault head is in sections and is about to be assembled over an opening, the end and side sections of the main frame are lowered in proper position about the opening to be covered, and the corners of the sections are then bolted at 3. Each cover plate 6 is then lowered into position upon the frame with the steel hooks 10 registering with the cavities 9 in the posts 8, and the edges 24 finally fitting the edges 23 of the frame. The cover plates will then take the position indicated in dotted lines in Fig. 4, with the curve 29 resting against the steel pintles 13 and the support 11 resting upon the edge 16. In this position, the upper surface of the entire edge is quite smooth, only the handles 34 appearing on the surface, and these may be sunk slightly in grooves.

When the covers are to be raised, the handles 34 may be raised and chains from the crane attached thereto, when the cover will be swung on the steel pintles 13 until the edge 31 will rest upon the surfaces 26. The sus-

pended blades 19 which hitherto have been attached to the lugs 20 only are now secured to the lugs 22 by the pins 21. The covers may remain in the inclined position when the blades are unattached, or the blades may be used in the disposal of snow masses as before explained. It is evident that the steel pintles 13 are exceedingly strong, and being cast in position in the walls 38 a relatively short length of the pintles is subject to violent strain. This mounting of the steel pintles fixedly in the cavity 9 is made feasible by reason of the possibility of disengaging the hook 10 therefrom, when it is desired. The relatively short pintles further assist their protection from accumulation of ice.

Although the covers may be so easily removed bodily from the frame, it will be apparent from Fig. 4, that as the cover is raised on its hinge, the surface 30 of the hook descends and engages the pintle, while the outer surface 27 rocks in contact with the surface 28 of the wall, until the hook has securely engaged the pintle and the cover securely held in the inclined position. This is regarded as a remarkable solution of the problem of hinging large heavy metal covers upon protected pintles, at the same time permit disengagement of the covers from their closed position.

Though I have illustrated this vault head as having sectional covers, it is not my purpose to limit this disclosure to a sectional cover, but contemplate using the same form of main frame in combination with a single cover, or any number of cover sections, as may be desired.

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

1. A vault head comprising a main frame having hollow hinge walls forming a narrow chamber directed transverse of said frame, a hinge pintle secured in said chamber beneath the surface of the frame, a cover having a hinge projection at one edge for engaging said pintle, the said hinge projection having a flat upper surface to lie in the plane of the cover and providing a lower open space adjacent the projection permitting disengagement of the cover by upward lifting thereof when the cover is closed, but preventing disengagement while the cover is open.

2. A vault head comprising a main frame having a large central opening and hollow hinge wall, a hinge pintle secured in the cavity in said hinge wall, a cover having a downwardly directed hook at one edge integral with said cover for engaging said pintle, the said engaging hook having a flat upper surface in a plane substantially that of the upper surface of the cover and a notch beneath the cover, permitting disengagement of the hook by upward lifting of the cover from the frame, and presenting a substan-

tially uniform flat surface covering the cavity about the pintle while applied to the frame.

3. A vault head comprising a main frame having a hollow hinge wall and narrow transverse and spaced openings partitioned from the main cavity in said hinge wall, the upper part of said openings communicating with the central opening in the frame, a cover-plate having downwardly-directed hook projections at one edge accurately fitting the said transverse frame openings, hinge pintles fixed at their ends in the walls of said partitions beneath the surface of said wall, the said projections being adapted to engage the said pintles when the cover is closed, and the said openings having rear arc-shaped shoulders upon which the hooks bear in their movement about the pintles to permit swinging of the cover to open the same.

4. A vault head comprising a main frame having a hollow hinge wall, reinforcing protuberant posts integral with the hinged wall and spaced from each other, cross partition wall sections dividing the cavity in said hinge wall into narrow chambers, hinge pintles positioned below the surface of the covers and connecting said sections, covers having means at one edge for engaging said pintles, and the back edge of said covers swinging in an arc about said pintles when the covers are raised so that they rest on the upper surface of the said posts when the covers are positioned at a slight inclination to the vertical.

5. A vault head comprising a main frame having a hollow hinge wall and narrow transverse and spaced openings partitioned from the main cavity in said hinge wall, the upper part of said openings communicating with the central opening in the frame and the lower part communicating with the central frame opening through drain apertures, a cover plate having hinge projections at one edge fitting the transverse frame openings, hinge pintles fixed at their ends in the walls of said partitions, the said projections engaging the said pintles to permit swinging of the cover to open the same.

6. A vault head comprising a main frame having hollow hinge walls, a hinge pintle secured in said wall beneath the surface of the frame, a cover having means at one edge for engaging said pintle, the said engaging means permitting opening the cover and resting its hinge edge upon the outer surface of the frame in its open position, and cutting means for snow masses connected both with the under surface of the open cover and with the inner surface of the open frame directly opposite the cover.

7. A vault head comprising a main frame of rectangular outline, a hinge pintle parallel to one of the frame edges and positioned beneath the surface thereof, a cover section accurately fitting the upper edges of the

frame and having means at one edge for engaging said pintle, and the back edge of said cover swinging in an arc about said pintle when the cover is raised, so that it rests on the upper surface of the frame when the cover is positioned at a slight inclination to the vertical.

8. A vault head comprising a main frame having hollow hinge walls, a hinge pintle secured in said wall beneath the surface of the frame, a cover having means at one edge for engaging said pintle and apertured lugs on its under surface, the said engaging means permitting opening the cover and resting its hinge edge upon the outer surface of the frame, apertured lugs upon the inner surface of the open frame opposite the lugs on the cover, and relatively thin elongated cutting bars connected at their ends with the said lugs on the cover and frame, respectively, by pins, the lower pins being removable.

9. A vault head comprising a main frame having a hollow hinge wall, reinforcing protuberant posts integral with the hinged wall and spaced from each other, cross partition wall sections dividing the cavity in said hinge wall into narrow chambers, hinge pintles positioned fixedly below the surface of the covers and connecting said sections, covers having means extending from one edge of the covers for engaging said pintles, the back edge of said covers swinging in an arc about said pintles when the covers are raised to rest upon the upper surfaces of said posts when the covers are positioned at a slight inclination to the vertical and fit tightly the adjacent surfaces of the posts when the covers are closed.

10. A vault head comprising a main frame of polygonal outline, a hinge pintle parallel to one of the frame edges and positioned beneath the surface thereof, a cover section accurately fitting the upper edges of the frame and having means at one edge for engaging the pintle, said means comprising a steel hook element extending from the said frame edge and having one end thereof molded into the iron mass of the cover section, and the back edge of the cover swinging in an arc about said pintle when the cover is raised to position the cover at a slight inclination to the vertical.

11. In a vault head having an open frame and a cover plate therefor, a steel hook element having an arm secured to the underside of the cover plate and the hook extended beyond the outline of the plate at one edge, the said hook having a flat upper surface uniformly continuous with the main upper surface of the cover and a notched under surface for detachably engaging a pintle of a hinge in the frame.

In witness whereof I have hereunto set my hand this eighteenth day of January, 1928.

ARTHUR WATHEY.