350-96.1

XR 1,762,383

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 1

Fig. 1

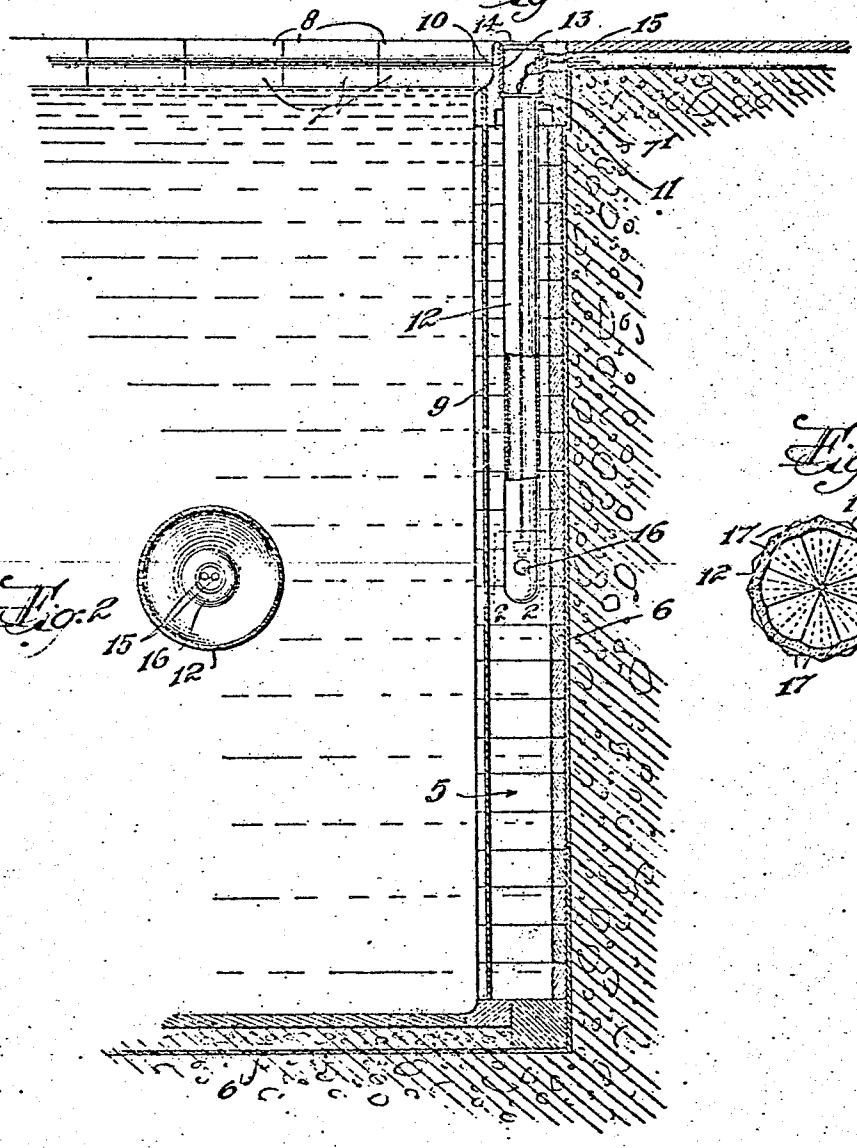


Fig. 2

Fig. 3

INVENTOR
J. Francis Booraem
BY C. P. Lefell
ATTORNEY

1762383
OR IN 240/2L

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 2

Fig. 4

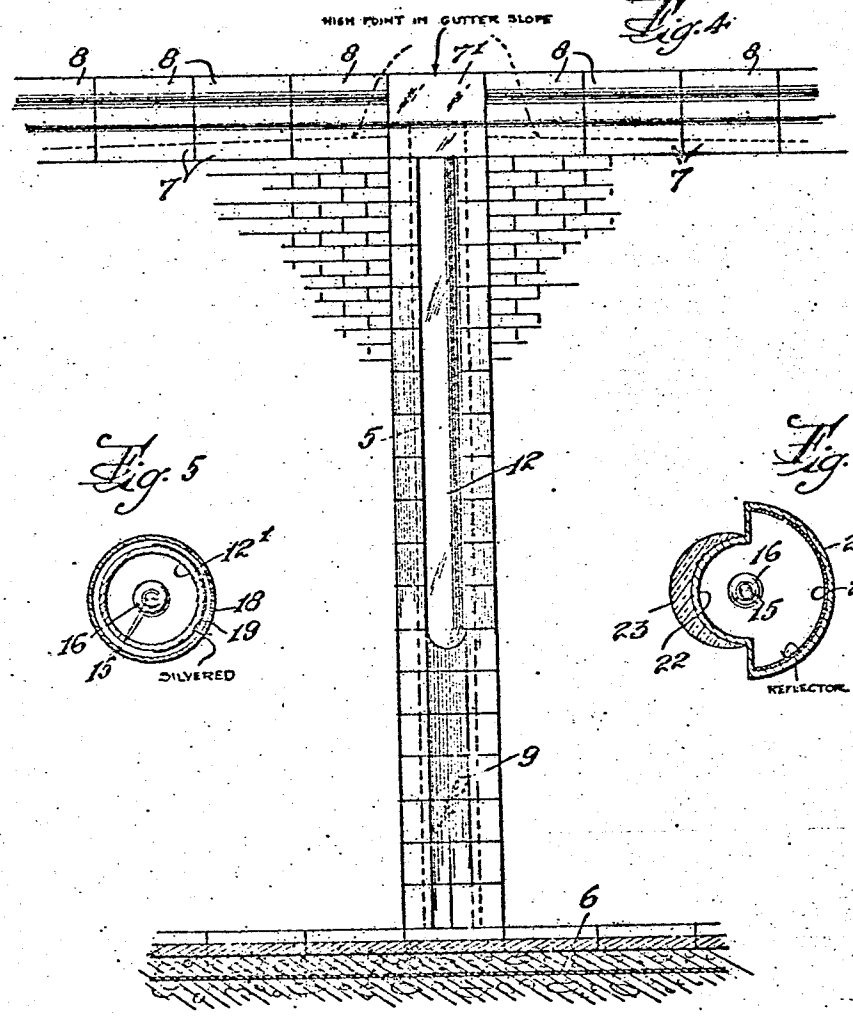
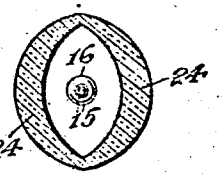


Fig. 5

Fig. 6

Fig. 7



INVENTOR
J. Francis Booraem
BY
C. P. Hefel
ATTORNEY

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 3

Fig. 8.

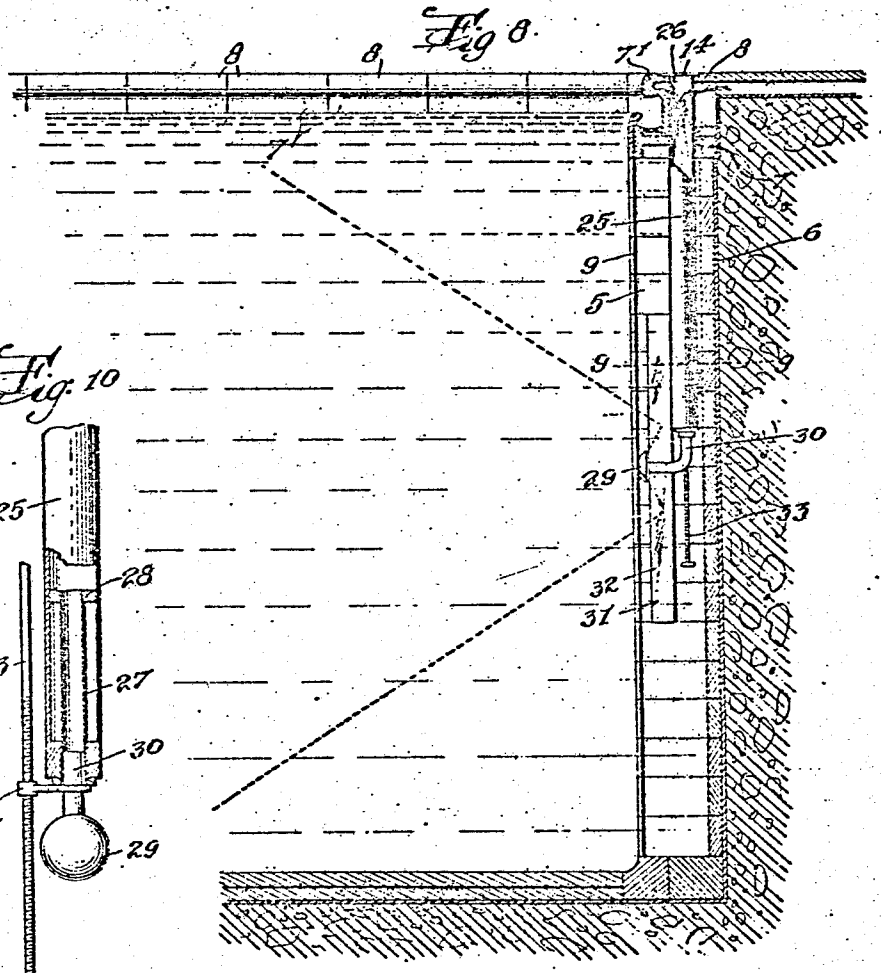
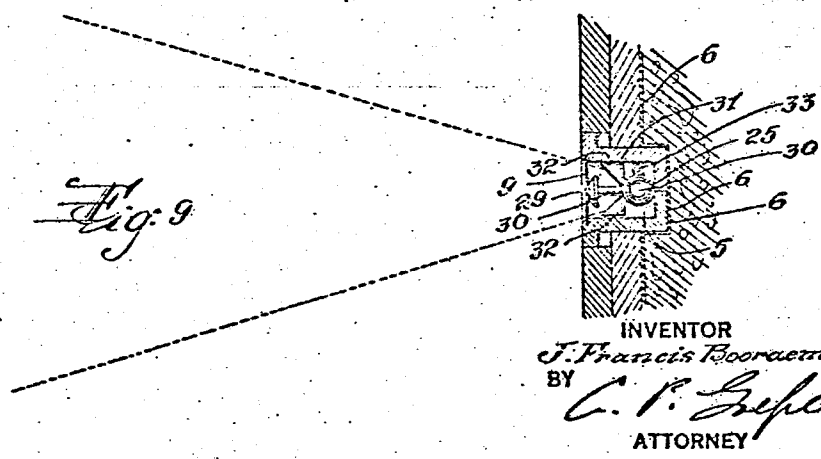


Fig. 10

Fig. 9



INVENTOR
J. Francis Booraem
BY
C. P. Siefert
ATTORNEY

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 4

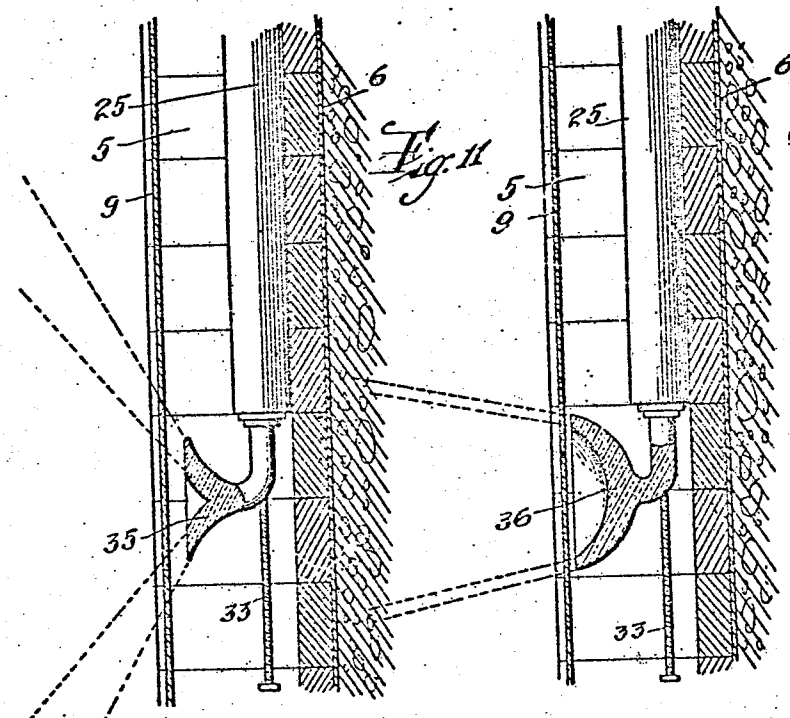


Fig. 11

Fig. 12



Fig. 15

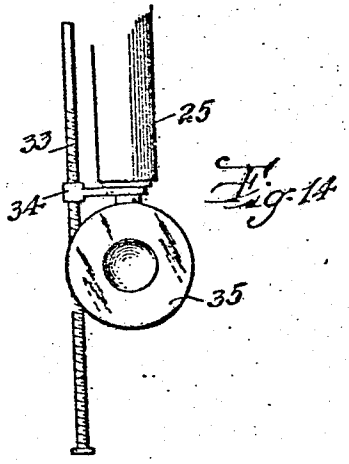


Fig. 14

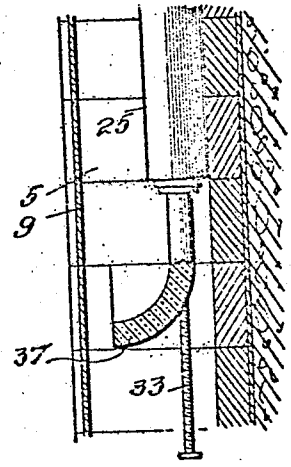


Fig. 13

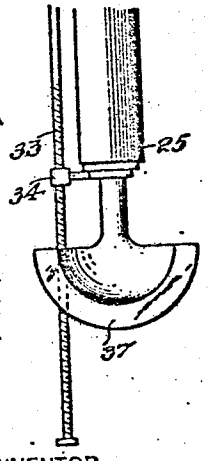


Fig. 16

INVENTOR
J. Francis Booraem
BY C. P. Goepel
ATTORNEY

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 5

Fig. 17

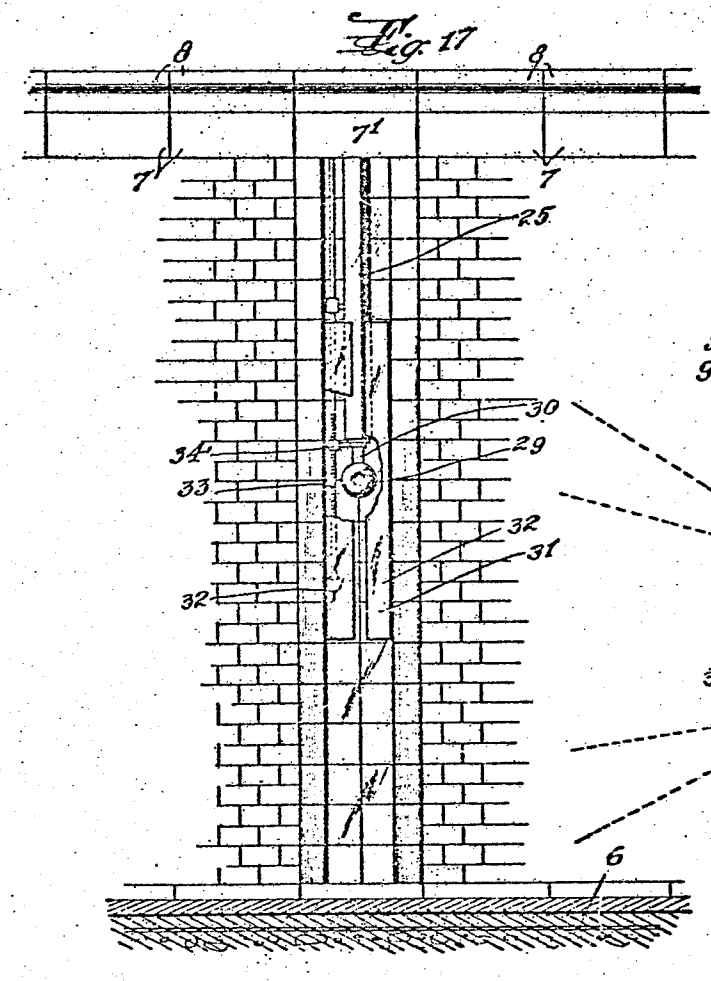


Fig. 18

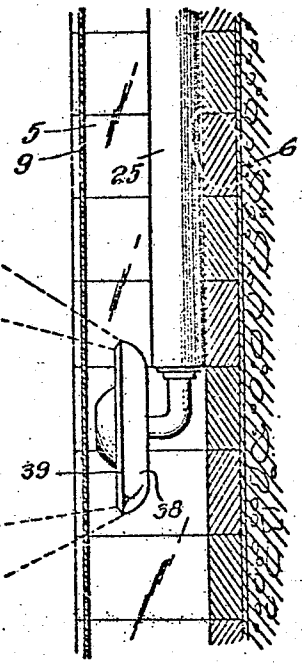


Fig. 21.

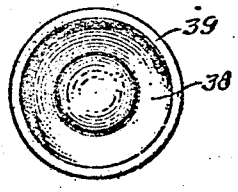


Fig. 20

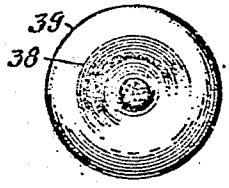
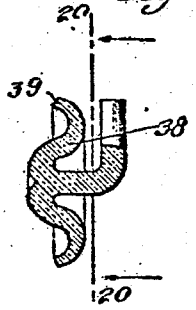


Fig. 19



INVENTOR
J. Francis Booraem
BY
C. P. Goepel
ATTORNEY

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 6

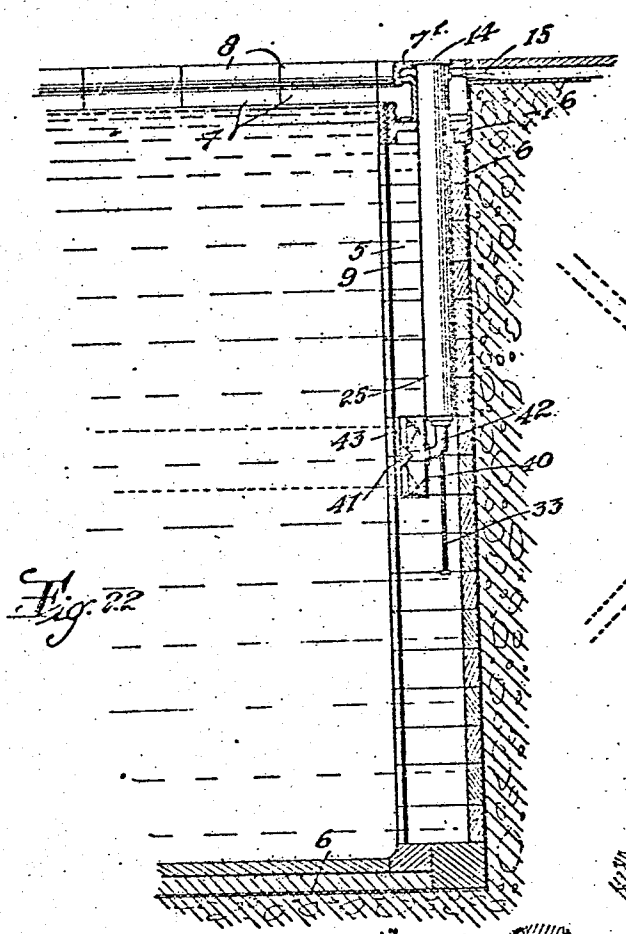


Fig. 22

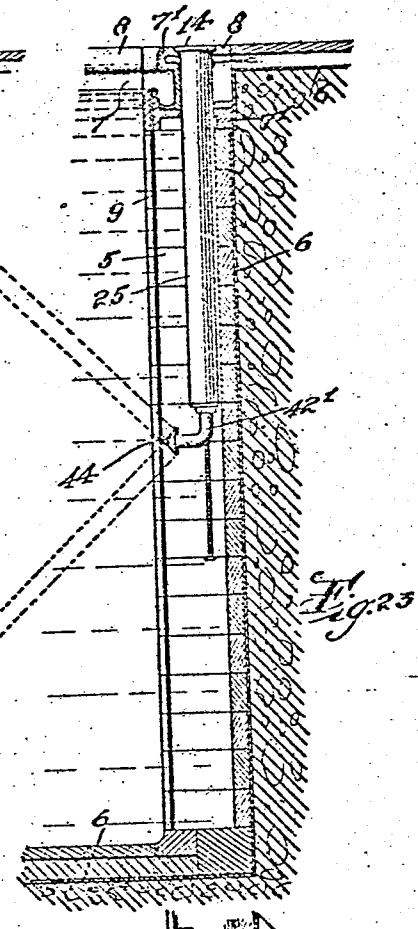


Fig. 23

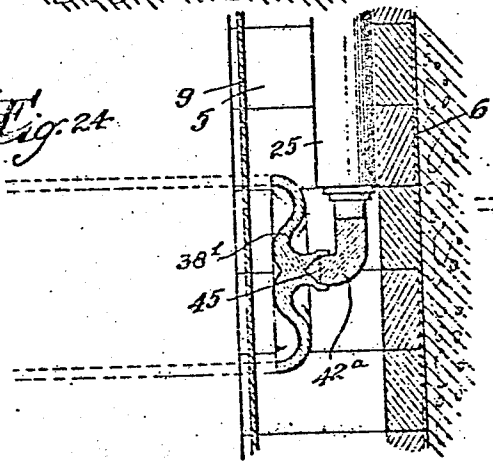


Fig. 24

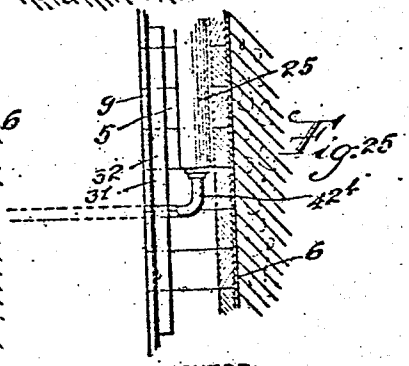


Fig. 25

INVENTOR
J. Francis Booraem
BY C. P. Goepel
ATTORNEY

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 7

Fig. 26

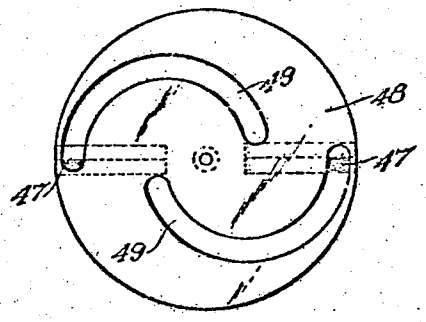


Fig. 27

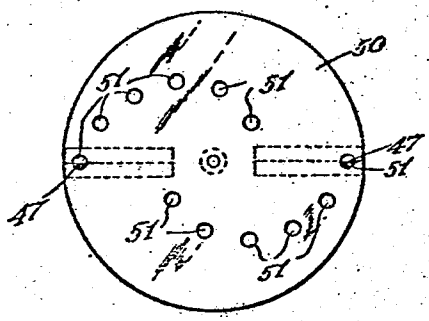


Fig. 31

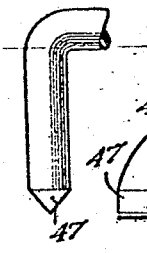


Fig. 30

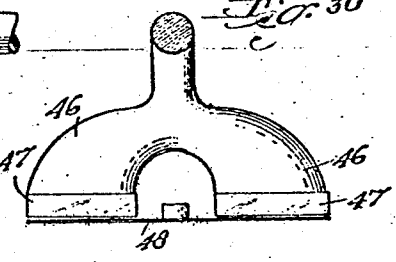


Fig. 28

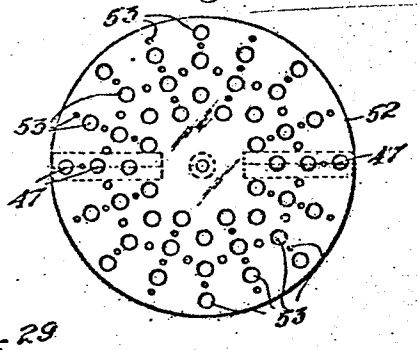
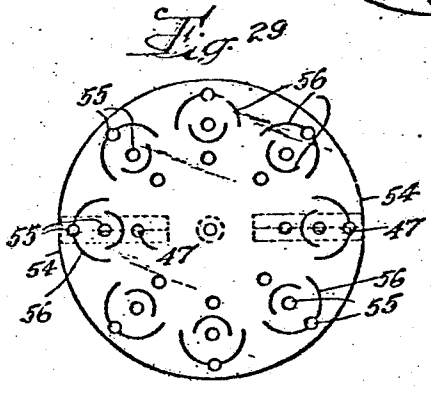


Fig. 29



INVENTOR
J. Francis Booraem
BY
C. P. Goepel
ATTORNEY

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 8

Fig. 32

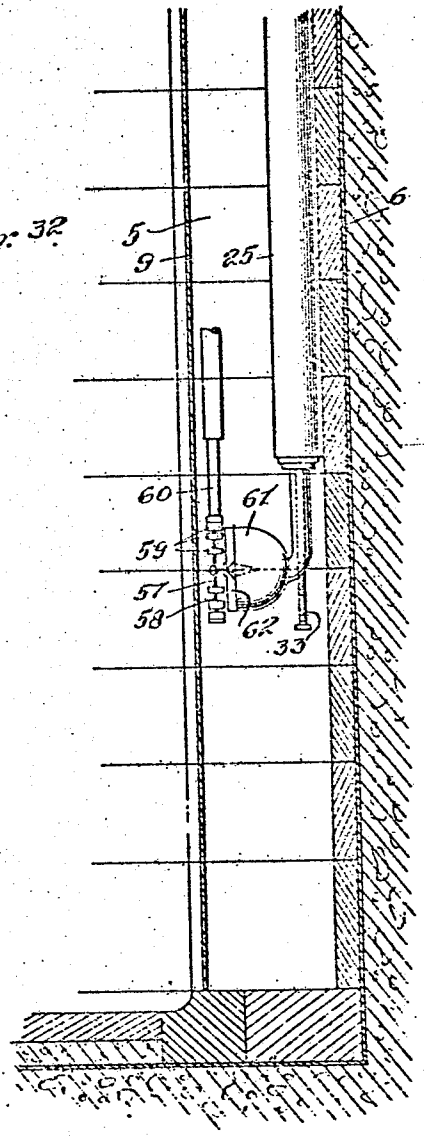
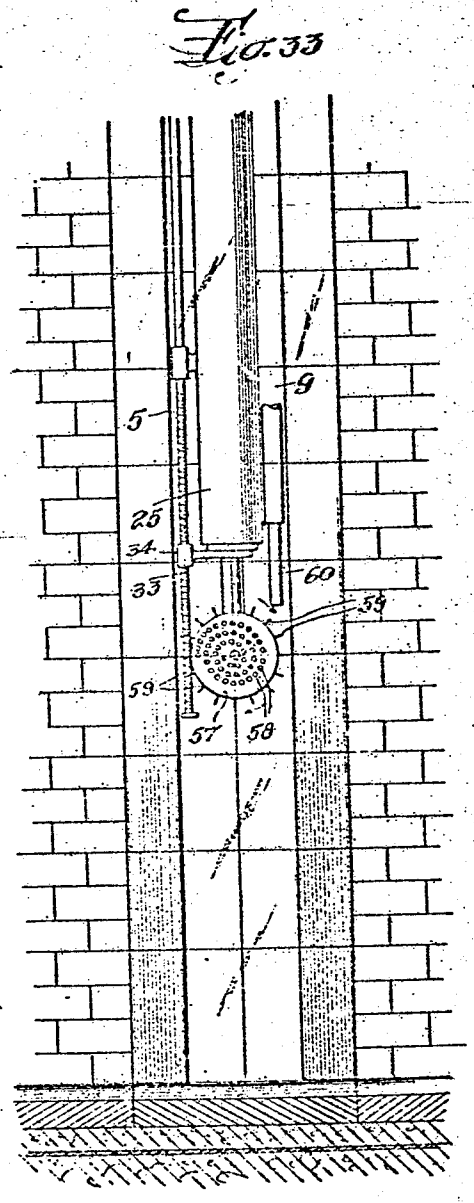


Fig. 33



INVENTOR
J. Francis Booraem
BY C. P. Byfield
ATTORNEY

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 9

Fig. 34

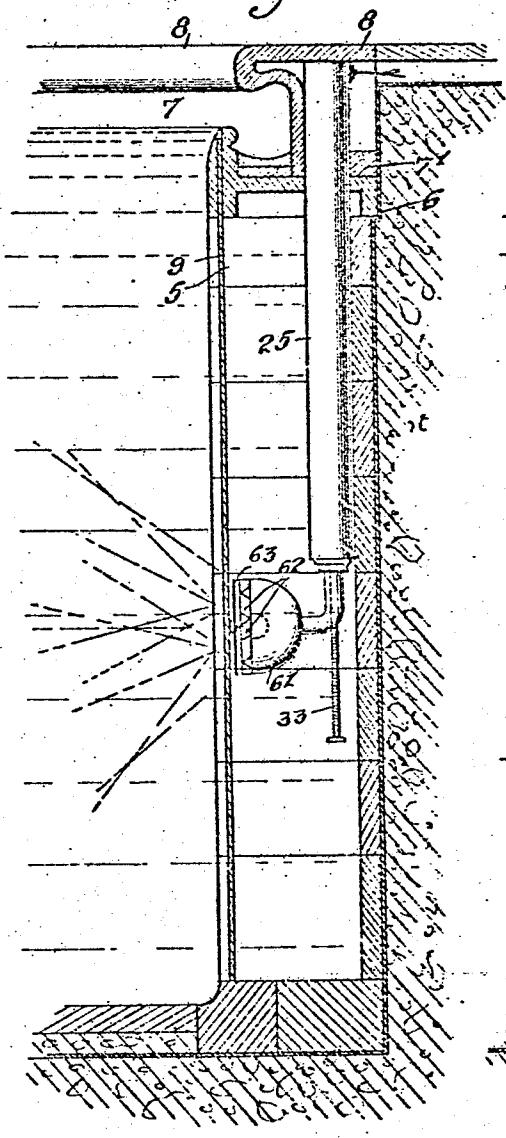
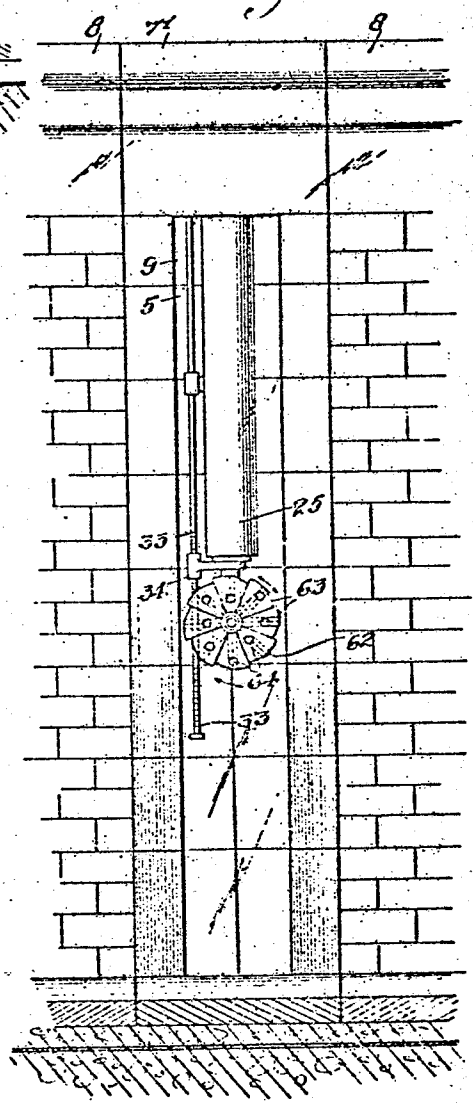


Fig. 35



INVENTOR
J. Francis Booraem
BY C. P. Byfield
ATTORNEY

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 10

Fig. 37

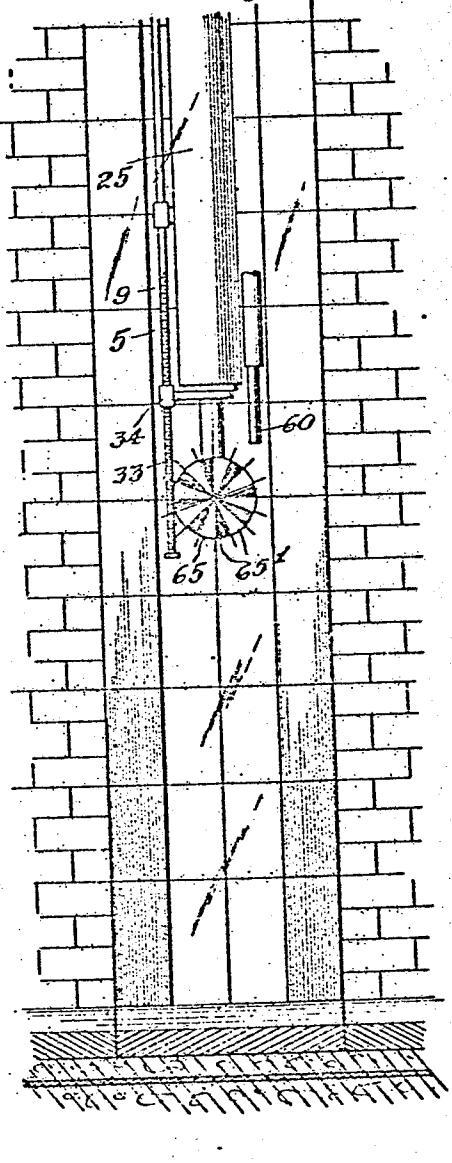


Fig. 36

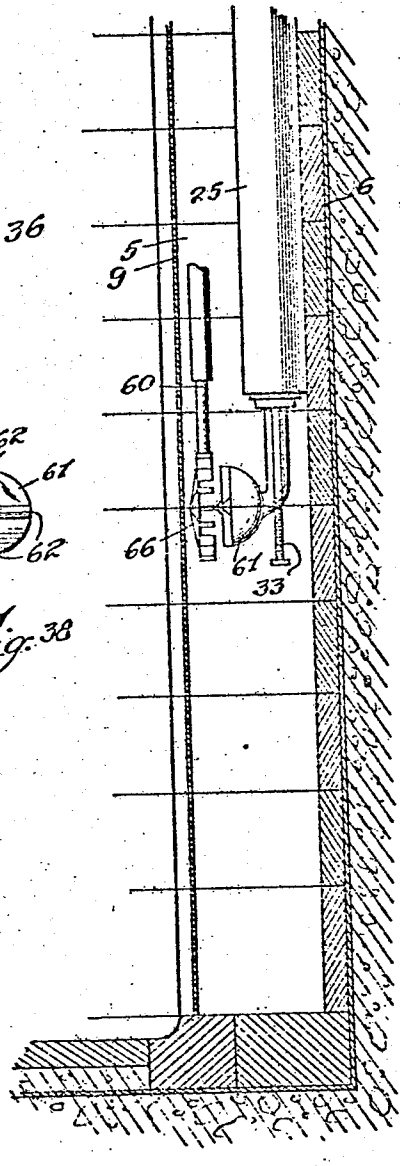


Fig. 38

INVENTOR
J. Francis Booraem
BY C. P. Lusfield
ATTORNEY

June 10, 1930. J. F. BOORAEM 1,762,383

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Filed Nov. 19, 1928 11 Sheets-Sheet 11

Fig. 39

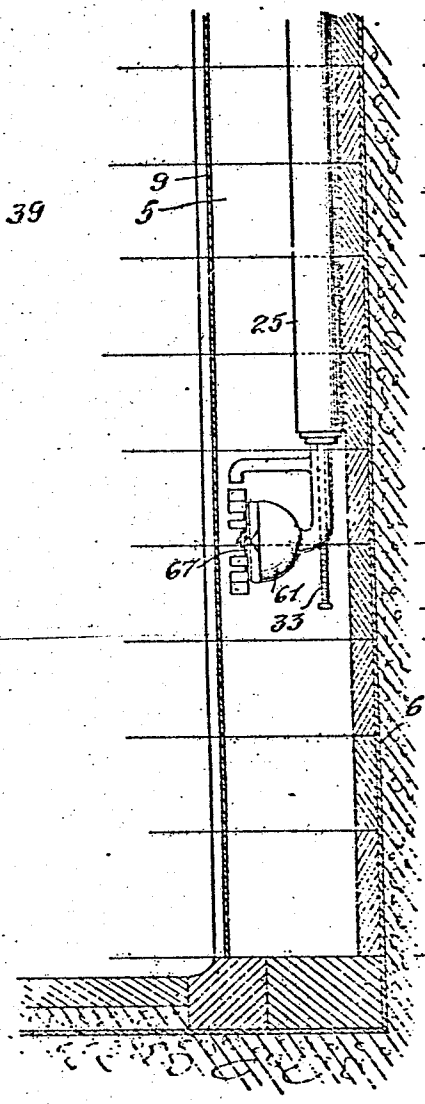
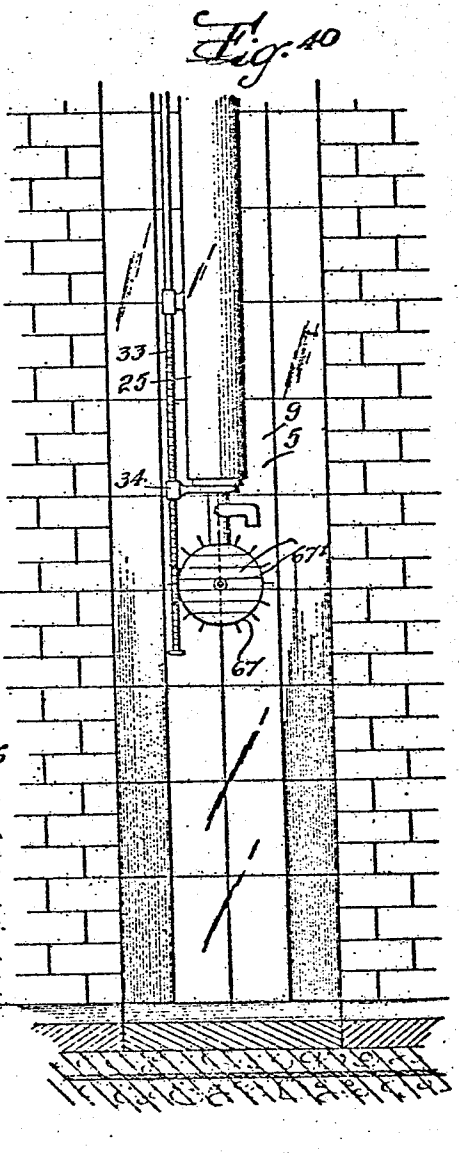


Fig. 40



INVENTOR
J. Francis Booraem
BY
C. P. Goepel
ATTORNEY

Patented June 10, 1930 1,762,383

UNITED STATES PATENT OFFICE

JOHN FRANCIS BOORAEM, OF GREENWICH, CONNECTICUT

SUBAQUEOUS ILLUMINATION OF SWIMMING POOLS

Application filed November 19, 1928. Serial No. 320,237.

This invention relates to illuminating means for swimming pools, and has for its primary object and purpose to provide a very simply constructed and easily controlled device which may be utilized in connection with modern swimming pool structures whereby novel and attractive under water lighting effects may be produced.

It is another important object of the invention to provide an illuminating means of this character which is so constructed and arranged that it does not necessitate the penetration of the interior water proof lining covering the inner surfaces of the side walls of the pool, thus obviating any possibility of leakage.

It is another object of my invention to provide such an illuminating means for swimming pools in which the light source is located above the water level, thus eliminating all danger of electrical shock to the swimmers which might be caused by the short circuiting of current supply wires, if the light source were submerged.

It is also a feature of another embodiment of the invention to provide a subaqueous light source at a suitable depth below the water level enclosed within a transparent glass tube which effectually insulates the light source and prevents charging of the water with electric current in the event of a short circuit.

It is a further object of the invention to provide simple and inexpensive means for conducting the light rays and diffusing the same into the body of water over a comparatively great area, such means in certain embodiments of the invention including means whereby the effect of moving light rays in the various colors of the spectrum may be produced.

It is also an additional object of the invention in a further embodiment thereof to provide a plurality of light refracting prisms in combination with power operated means for continuously or intermittently projecting the colors of the spectrum emanating from said prisms into the water contained in the pool.

It is a further general object of the invention to provide simple and reliable means whereby the light diffusing means may be adjusted vertically to various positions between the water level and the floor of the pool.

With the above and other objects in view, the invention consists in the improved illuminating means for swimming pools and in the form, construction and relative arrangement of the various parts thereof as will be hereinafter more fully described, illustrated in the accompanying drawings and subsequently incorporated in the subjoined claims.

In the drawings, wherein I have illustrated several simple and practical embodiments of my invention, and in which similar reference characters designate corresponding parts throughout the several views,—

Figure 1 is a vertical sectional view through one side wall of a swimming pool showing one embodiment of the invention in which a subaqueous light source is employed together with suitable means for insulating the same and for also diffusing the light rays into the water of the pool;

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1;

Fig. 3 is a similar sectional view showing a slightly modified form of the glass insulating tube within which the light source is enclosed;

Fig. 4 is a fragmentary elevation of one of the side walls of the pool having my invention applied thereto;

Figs. 5, 6 and 7 are horizontal sectional views showing several different alternative forms of the enclosing tube for the light source and means whereby the light rays emanating therefrom may be reflected, refracted and diffused through the pool water;

Fig. 8 is a vertical sectional view through one side wall of a pool showing another embodiment of the invention applied thereto;

Fig. 9 is a horizontal sectional view taken on the line 9—9 of Fig. 8;

Fig. 10 is a detail vertical section through the lower end of the light conducting tube showing the mounting and arrangement of the quartz crystal;

Figs. 11, 12 and 13 are detail vertical sectional views showing one form of the quartz crystal which may be used;

Figs. 14, 15 and 16 are front elevations of

the device as shown in Figs. 11, 12 and 13 respectively;

Fig. 17 is an interior side elevation of the pool wall showing the embodiment illustrated in Fig. 8, parts of the light deflecting members being broken away;

Fig. 18 is a fragmentary vertical sectional view through the wall of the pool showing another form of the light diffusing quartz crystal;

Fig. 19 is a diametrical sectional view through the quartz crystal shown in Fig. 18;

Fig. 20 is a sectional view taken on the line 20—20 of Fig. 19;

Fig. 21 is a front side elevation of the quartz crystal shown in Fig. 19;

Fig. 22 is a vertical sectional view through one side of the pool structure showing still another embodiment of the invention;

Fig. 23 is a similar view illustrating an alternative form of the device;

Fig. 24 is a detail vertical section illustrating a modification of the construction shown in Figs. 18 and 19;

Fig. 25 is a similar sectional view showing the form of the device for projecting a concentrated beam or pencil of light into the pool;

Figs. 26, 27, 28 and 29 are detail views of various forms of rotatable light diffusing control discs;

Fig. 30 is a detail plan view showing one form of the light conducting quartz and arrangement of the refracting prisms;

Fig. 31 is an edge view thereof;

Fig. 32 is a fragmentary vertical sectional view of one side wall of the swimming pool showing the mounting and arrangement of one of the rotatable light control discs in combination with the quartz crystal and refracting prisms;

Fig. 33 is an interior side elevation of the pool provided with the latter form of the device;

Fig. 34 is a view similar to Fig. 1 showing a still further alternative embodiment of the invention;

Fig. 35 is an interior side elevation similar to Fig. 33 showing the latter modification;

Figs. 36 and 37 are views similar to Figs. 32 and 33 showing still another form of the invention;

Fig. 38 is a detail front elevation of the quartz crystal and light refracting prisms as shown in Figs. 32 and 36, and

Figs. 39 and 40 are views similar to Figs. 32 and 33 showing another alternative embodiment of the device.

In the various embodiments of my invention which I have selected for purposes of illustration, I have shown the same as applied to a pool structure, the side and end walls of which are built up of terra cotta and enameled brick, or brick faced with enameled tiling and provided at spaced intervals with vertically extending chambers, depressions, or pockets indicated at 5. These side and end walls of the pool throughout the area thereof, as well as the floor of the pool structure throughout its area are backed by heavy water proofing fabric which is also carried around the depressions or pockets 5 as indicated at 6. The upper ends of the vertical pockets, depressions or chambers 5 are closed by the gutter or life rail members or tiles indicated at 7 with which there is associated in superposed relation the tile of the capicourse indicated at 8.

If desired, however, as indicated in certain of the figures, the gutter and capicourse tile may be integrally formed. The sides of the chambers or pockets 5 facing the interior of the pool are faced with special shapes of the terra cotta or enameled tile but are otherwise open to the flow of water and covered with the transparent glass plates 9 which are vertically slidable in suitable guide ways formed in the tile and the gutter and life rail tiles 7. However, it is not necessary to make these transparent closures for the pockets or chambers 5 water tight, and the water from the pool may freely enter and circulate within these chambers around the edges of the glass plates, which need not necessarily extend to the bottom of the pool.

In the particular embodiment of the invention shown in Fig. 1 of the drawings, at the upper end of each of the vertically extending chambers or pockets 5, a tile 7′ of special form is interposed in the line of the gutter and capicourse tile 7 and 8, said tile 7′ interrupting the gutter channel, the base walls of the gutter sections sloping downwardly in opposite directions from said tile to a suitable outlet as seen in Fig. 4 of the drawings. The tile 7′ is provided with a cavity 10 therein opening upon the upper face of said tile and an opening 11 of relatively small diameter is formed through the tile and communicates with the base of said cavity. Through this opening an elongated glass tube 12 is inserted downwardly into the chamber 5. This tube may be of any desired length, but preferably is of such length that its lower closed end is positioned substantially midway between the maximum water level of the pool and the bottom or floor thereof.

The cavity 10 is adapted to receive a metal sleeve 13 which bears upon a flange formed on the upper end of the glass tube 11 and holds the same tightly against the annular shoulder surrounding the upper end of the opening 11. The upper end of this sleeve is closed by a removable cap 14 which is flush with the upper face of the tile 7′. By the removal of this cap, access may be had for the purpose of feeding the current conducting wires 15 for an electric lamp 16 of high wattage, downwardly into the glass tube 12. These wires may be extended laterally

through a guide in the wall of the sleeve 13 and an opening in the tile 7' beneath the floor tile which surrounds the pool and connected by means of a plug with a conveniently located surface outlet.

With the arrangement above described, it will be seen that the interior of the tube 12 being thoroughly water tight, the lamp 16 is thereby protected and the possibility of the water short-circuiting the current so that the water would become charged, is obviated. The lamp being located in the lower end of the tube 12 provides direct subaqueous illumination of the body of water contained in the pool, the light rays being diffused through the wall of the tube 12 and plate 9. If desired, the latter may be colored. Also, in order to intensify the concentration of light rays upon the pool water, the inner surface of the rear part of the wall of the tube 12 may be silvered or otherwise provided with a suitable light reflecting means.

In Fig. 3 of the drawings, I have illustrated another form of the tube 12 which may be provided with sections each having a plurality of longitudinally extending plane surfaces 17 and with the surfaces of one section being positioned at an angle with relation to the contiguous plane surfaces of the adjacent section of the tube. This form of the tube may be produced in glass to refract the light rays emanating from the lamp 16 and diffuse the same into the pool water. In such case, it will be understood that the front side of the chamber or pocket 5 is covered by a colored or uncolored transparent plate 9.

In Fig. 5 of the drawings, I have shown the tube 12' enclosed within an outer tube 18 of glass, the inner tube having the rear side of its wall silvered as indicated at 19. The outer tube 18 provides a protecting casing for the inner tube, and in this case, it may be possible to dispense with the use of the glass plates 9, the primary purpose of which is to prevent the hands or feet of the bathers coming into contact with the tube 12 and possibly breaking the same. Other suitable guard means through or between which the light may pass may be substituted for the plates 9.

In Fig. 6 of the drawings, I show another form of the enclosing and protecting tube for the lamp bulb in which said tube includes a rear section 20 of relatively large diameter having an inner reflecting surface 21, and the forward section 22 of relatively small diameter. To the outer side of this section 22 of the tube, a body of glass 23 is suitably secured. The light rays directly passing from the lamp and those which are reflected by the surface 21 through the glass 23 are projected along radial lines through the pool water. In this case likewise, the front plates 9 for the chambers or pockets 5 may be omitted.

Fig. 7 shows another alternative form of the tube in which the same is entirely formed of light refracting glass, and is provided with opposite sections 24 decreasing in thickness from the center of each section to the opposite sides of the tube.

In the construction illustrated in Fig. 8 of the drawings, instead of employing the glass tube 12, a metal tube 25 extends downwardly into the chamber or pocket 5 and the high powered electric lamp 26 is suitably mounted in the upper end of this tube to throw the light rays downwardly through the tube. If desired, the tube wall may be provided with a reflecting surface, such as white enamel, and a suitable form of reflector may also be directly associated with the lamp 26 so as to intensify the light rays.

A second relatively short tube 27 is telescopically connected or associated with the lower end of the tube 25 either interiorly or exteriorly thereof. In the present instance, I have shown the tube 27 disposed within the end of the tube 25 and open at its upper end so that the light rays may have an unobstructed passage therethrough. To this upper end of the tube 27 an annular collar or gasket 28 is fixed and has water tight sliding engagement with the wall of the tube 25.

In the lower end of the tube 25 one end of the cylindrical shank 30 of a light conducting quartz crystal body 29 is suitably secured. The body 29 of the quartz at the other end of the shank 30 as shown in Figs. 8 to 10 of the drawings, is of semi-spherical form. Preferably, this body is in the form of a cupped disc having a rearwardly facing beveled perimeter, and the light rays passing through the quartz body are projected from the perimeter thereof against reversely angled faces 32 of the vertically positioned light deflecting quartz members 31 which are suitably connected with the lower end of the tube 27 carrying the quartz crystal. The light beams are thus deflected and projected outwardly at diverging angles through the glass plate 9 into the pool.

The tube 27 is of such length as to permit of a certain amount of vertical adjustment of the same together with the crystal 29 and the deflecting members 31 relative to the tube 25. For this purpose, I may provide any conventional mechanical means, but as herein shown, one simple device for this purpose may consist of the rod 33 extending downwardly into the chamber 5 through a suitable bearing provided on the wall of the tube 10. The lower end portion of this rod has threaded engagement in a bracket arm 34 suitably fixed to the lower end of the tube 27 externally of the tube 25. Thus, by rotating this rod, the light conducting quartz together with the deflecting members 30 may be moved to various vertical positions between the lower end of the tube 25 and the pool floor.

In Figs. 11 to 16 of the drawings, I have

sh[illegible] different forms of the quartz members which may be employed without using the deflecting members 31. In Fig. 11, the quartz member terminates at its lower end in a forwardly projecting hollow cone 35 which presents a comparatively wide annular end face adjacent to the glass 9. Thus as indicated by the dotted lines in this figure, the light beam is projected through the glass crystal and into the body of water in the pool in the form of a widely flaring comb of variegated light rays.

In Fig. 12, the quartz member is shown in the form of a hollow cup 36 having its concave side opposed to the glass 9 so that in this case, as indicated by the dotted lines in Fig. 11, a cylindrical tapering beam of light will be projected into the water in the pool.

In Fig. 13, the quartz member is shown in the form of a concavo-convex sector 37 having a forwardly presented semi-circular edge from which the light beam is projected into the pool.

In Figs. 18 to 21 inclusive, there is illustrated another form of the quartz member in which said member is of the sectional form shown in Fig. 19 and consists of a plate or disc 38 formed on the forwardly projecting end of the cylindrical shank, said disc having its wall reversely curved to provide an annular edge face 39 disposed at a suitable angle and from which a cone shaped beam of light will be directly projected outwardly through the glass plate 9 into the pool.

In the form of the invention shown in Fig. 22, the quartz member carries a suitable casing or housing 40 having its front side open and within which there is arranged diametrically of said front side of the housing, a light deflecting member 41 of triangular shape in cross section. The light rays from the quartz 42 are projected against the reversely angled faces of the quartz deflecting member 41 and by the same are deflected against an annular or ring shaped light deflecting member 43 which is secured within the housing or casing 40. Thus in this case a cylindrical beam of light will be projected outwardly into the pool.

In Fig. 23 of the drawings, there is directly secured upon the angular end of the quartz cylindrical shank 42′ a glass prism 44 from the reversely angled faces of which two beams of light in variegated colors are angularly projected upwardly and downwardly respectively, into the pool.

In Fig. 24, I have shown an alternative form of the device wherein the quartz light conducting and distributing body 38′ is formed separately from the quartz shank 42ª and provided at its rear side with a suitably formed socket to receive the out-turned end of said shank. A prism 45 is interposed between said shank and the quartz body 38′. Thus as the light rays leave the shank 42ª they pass through the prism 45 by which they are broken up into the various colors of the spectrum, and such colored light rays finally projected from the edge of the quartz member 38′ in the form of a variegated cylindrical light beam into the pool.

In Fig. 25 of the drawings, I have shown the quartz member merely in the form of the cylindrical shank 42ᵇ having its lower end forwardly bent or turned. A quartz member of this form is used where it is desired merely to project a light beam in the form of a cylindrical pencil of relatively small diameter into the pool.

In a further embodiment of my invention, I also provide means for intermittently interrupting the projection of the light beam into the pool water and which provides the illusion of a moving light beam which may be either white, or in the various colors of the spectrum. In order to secure this result, a slotted or perforated disc is rotatably mounted forwardly of the quartz member and preferably behind the glass plate 9. In Figs. 26 to 29 inclusive, 33, 35 and 37 to 40 inclusive, I have shown various different forms of the light interrupting discs. In conjunction with these rotatable discs, I preferably use a quartz member of the kind shown in Fig. 30 in which the light conducting body of said member is provided with the forked or diverging branches 46 having plane end faces upon each of which is mounted a single glass prism 47, acting by refraction to produce the various colors of the spectrum. The rotatable disc is journalled upon an axis centrally fixed with relation to the quartz body and rotation in a vertical plane closely adjacent to the glass prisms 47.

The rotating disc 48 as seen in Fig. 26 of the drawings is provided with two eccentric slots 49 therein which are arranged in opposed relation and are adapted to cooperate with the radially positioned prisms 47. In the arrangement shown, in the rotation of the disc, it will be seen that the corresponding inner and outer ends of these slots pass over the inner and outer ends of the respective prisms 47 at the same time, thus permitting the same or contrasting color of the spectrum from the prisms to pass through said slots and be projected into the pool. Owing to the eccentricity of these slots, the color of the light beams will be constantly changing without interruption until the outer ends of the slots move over the outer ends of the prisms, at which time the light beams will again be projected from the other prisms through the inner ends of the slots.

In Fig. 27 of the drawings, the disc 50 is provided with two series of spaced openings 51, each series being arranged on an eccentric curve, so that in this case the same variations in color will be obtained, but the projection of the light beams will be interrupted by the

parts of the disc intervening between the spaced openings.

In Fig. 28 the disc 52 is provided with a multiplicity of radially arranged series of openings 53, each series including one or more openings of small diameter and additional openings of greater diameter. Thus, in this case as each series of said openings passes over one of the prisms, a plurality of beams of light of relatively different size and colors will be projected at the same time.

In Fig. 29 the disc 54 is provided with the radially spaced series of openings 55 and in addition thereto with the slits 56. As shown, these slits are curved. However, they might also be of other geometrical forms and in other arrangements than that shown in the drawings so as to produce a novel and attractive illusion of moving light beams of variegated colors in the pool water.

In the arrangement shown in Figs. 32 and 33 of the drawings, I show another form of the rotating disc 57 which may be provided with any one of the above referred to means for interrupting the projection of the light beams, or as shown in said figures, this disc may be provided with the spiral arrangement of closely spaced openings as indicated at 58. This disc 57 in the illustrated construction is provided on its periphery with spaced radially projecting vanes or blades 59 against which water under pressure is delivered from the pipe 60 in tangential relation to the disc 57 so that said disc will be rotated in the manner of the common water wheel. The pipe 60 may be supplied from the pump which is used in the refiltration system of the pool for circulating the pool water through a suitable filter, or said pipe may be directly supplied with water from a suitable pressure line. The relatively small excess of water supplied to the pool through the pipe 60 would merely replace the water which splashes over into the pool gutters in the movements of the bathers.

In the arrangement shown in Fig. 32, the quartz body may be provided with additional radiating arms similar to the arms 46 in Fig. 30 and positioned at right angles thereto, or this quartz body 61 may consists of a hemisphere having a flat face opposed to the glass 9. Thus provision is obtained upon either form of the quartz body for the attachment of the radiating glass prisms 62 arranged at a 90° angle with respect to each other so that in each rotation of the disc, a greater number of light beams will be projected into the pool and the interruptions of these light beams will more frequently occur. It is of course, understood that the light rays from the high powered electric blub are conducted substantially at their original intensity through the quartz member and are received by the several prisms 62 and broken up into the various colors of the spectrum.

In Figs. 34 and 35 of the drawings, I have shown another form of the rotating disc which is composed of a plurality of angularly related sections 63, each section providing a radially extending impingement surface against which the water stream from the pipe 60 is directed to rotate the disc. Each of these sections is provided with a single opening 64 therein, said openings being spaced at relatively different distances from the center of rotation of the disc. Thus, in this case, it will be apparent that the effect of the moving light beams is also produced with a somewhat longer period of interruption. However, as indicated in dotted lines in Fig. 35, I may also provide additional prisms on the end face of the quartz body so that the prisms will be spaced apart at a 45° angle.

In Figs. 36 and 37, I have shown still another embodiment of the invention wherein a rotating glass disc 65 is employed. To the front surface of this glass disc a plurality of radially disposed reflecting members 66 are suitably secured. The glass between adjacent reflecting members may have differently colored sections as indicated at 65', or one of said sections may if desired, be rendered opaque to interrupt the projection of the light beams. In this case, the disc is rotated in the same manner as illustrated in Fig. 33 of the drawings.

In Figs. 39 and 40 of the drawings, the rotating disc 67 is provided upon its front surface with a plurality of parallel ribs or shoulders 67' so that in the rotation of the disc, the light beams will be broken up and the angular direction of projection of the light beams varied.

From the foregoing description considered in connection with the accompanying drawings, the several illustrated embodiments of my present improvements will be clearly and fully understood. The several constructions referred to are relatively simple in the form and arrangement of the several elements and can be easily mounted and arranged in operative position in the building of the pool at a nominal additional cost. It will be seen that in each case, I provide a means for very effectively and attractively illuminating the the pool, and at the same time have entirely avoided the necessity of penetrating the water proof backing sheet 6 of the pool structure so that there will be no liability of the leakage of the pool water therethrough.

In addition to the several embodiments of the invention referred to, it is also possible that similar results might be obtained in the use of various other alternative mechanical forms of the invention, and I therefore, reserve the privilege of resorting to all such legitimate changes therein as may be fairly embodied within the spirit and scope of the invention as claimed.

I claim:

1. A swimming pool structure having a chamber in its vertical wall, opening into the pool and a transparent plate covering said open side of the chamber, sub-surface illuminating means for the pool including a source of artificial light located above said chamber, means arranged within the chamber for projecting a light beam through said transparent cover plate into the body of water contained in the pool, and means for conducting the light from said light source to said beam projecting means.

2. A swimming pool structure having its wall backed by water proofing material, one of the vertical walls of the pool having a chamber opening into the pool, a transparent cover plate for said open side of the chamber, and sub-surface illuminating means for the pool including means for projecting a light beam through said transparent cover plate into the pool, and means for conducting light from an artificial light source to said beam projecting means, and said illuminating means being mounted and arranged entirely at the inner side of said water proof backing for the pool walls.

3. A swimming pool structure having its walls backed by water proofing material, and one of the vertical walls of the pool provided with a chamber opening into the pool and a transparent cover plate for said open side of the chamber, sub-surface illuminating means including means for deflecting and diffusing light through said transparent cover plate into the pool arranged within said chamber, a source of artificial light located above the maximum water level of the pool, and means for conducting the light from said light source to the deflecting and diffusing means extending downwardly into said chamber entirely within the water proof backing for the pool walls.

4. A swimming pool structure having its walls backed by water proofing material and provided with a chamber in one of its vertical walls opening into the pool and a transparent cover plate for the open side of said chamber, sub-surface illuminating means for the pool including an artificial light source located externally of said chamber, a plurality of light refracting prisms arranged within said chamber, means positioned inwardly of the water proof backing for the pool walls and extending into said chamber to conduct ligh from the light source to said prisms, and means for diffusing the light rays from said prisms through said transparent cover plate into the pool.

5. A swimming pool structure having its walls backed by water proofing material and provided with a chamber in one of its vertical walls opening into the pool and a transparent cover plate for the open side of said chamber, sub-surface illuminating means for the pool including an artificial light source located externally of said chamber, a plurality of light refracting prisms arranged within said chamber, means positioned inwardly of the water proof backing for the pool walls and extending into said chamber to conduct light from the light source to said prisms, and power operated means movably mounted with respect to said prisms to vary the angle of projection of the refracting light rays from the prisms through said transparent cover plate into the pool.

6. A swimming pool structure having its walls backed by water proofing material and provided with a chamber in one of its vertical walls opening into the pool and a transparent cover plate for the open side of said chamber, a sub-surface illuminating means for the pool including an artificial light source located externally of said chamber, a plurality of light refracting prisms arranged within said chamber, means positioned inwardly of the water proof backing for the pool walls and extending into said chamber to conduct light from the light source to said prisms, and a power operated rotatable disc associated with said prisms and provided with openings progressively moving across the prisms lengthwise thereof in the rotation of the disc to vary the angles of projection of the light rays from the prisms through said transparent cover plate into the pool.

7. A swimming pool structure having its walls backed by water proofing material and provided with a chamber in one of its vertical walls opening into the pool and a transparent cover plate for the open side of said chamber, sub-surface illuminating means for the pool including an artificial light source located externally of said chamber, a plurality of light refracting prisms arranged within said chamber, means positioned inwardly of the water proof backing for the pool walls and extending into said chamber to conduct light from the light source to said prisms, an opaque disc rotatably mounted between the prisms and said transparent cover plate and provided with opposed eccentric slots progressively moving across the prisms lengthwise thereof in the rotation of the disc to cause a movement of the light beams projected from the respective prisms through said slots into the pool, and means for rotating said disc.

8. A swimming pool structure having its wall backed by water proofing material and one of the vertical walls thereof provided with a chamber opening into the pool and a transparent cover plate for said open side of the chamber, an artificial light source external to said chamber, and sub-surface illuminating means for the pool including a quartz body of predetermined geometrical form for projecting a light beam of the desired shape through said transparent cover plate into the

pool, and means wholly positioned within said water proof backing for conducting light from said artificial light source to said quartz body.

9. A swimming pool structure having its wall backed by water proofing material and one of the vertical walls thereof provided with a chamber opening into the pool and a transparent cover plate for said open side of the chamber, an artificial light source external to said chamber, and sub-surface illuminating means for the pool including a quartz body of predetermined geometrical form for projecting a light beam of the desired shape through said transparent cover plate into the pool, means wholly positioned within said water proof backing for conducting light from said artificial light source to said quartz body, and means for vertically adjusting said quartz body in said chamber relative to said light conducting means.

10. A swimming pool structure having its wall backed by water proofing material and one of the vertical walls thereof provided with a chamber opening into the pool and a transparent cover plate for said open side of the chamber, an artificial light source external to said chamber, and sub-surface illuminating means for the pool including a quartz body of predetermined geometrical form for projecting a light beam of the desired shape through said transparent cover plate into the pool, one or more light refracting prisms associated with said quartz body, and means wholly positioned within said water proof backing for conducting light from said artificial light source to said quartz body.

11. A swimming pool structure having its walls backed by water-proofing material, one of the vertical walls of the pool having a chamber therein and a transparent plate covering the open side of said chamber at the interior of the pool, and subsurface illuminating means for the pool arranged entirely at the inner side of the water-proof backing for the pool wall, said means including a light source, and means located within said chamber for projecting light rays emanating from said source laterally through said transparent plate into the pool water.

12. A swimming pool structure having its walls backed by water-proofing material, one of the vertical walls of the pool having a chamber therein and a transparent plate covering the open side of said chamber at the interior of the pool, and subsurface illuminating means for the pool arranged entirely at the inner side of the water-proof backing for the pool wall, said means including a light source, and means arranged within said chamber for diffusing light rays emanating from said source and projecting the same laterally through said transparent plate over a comparatively extensive area into the pool water.

13. A swimming pool structure having its walls backed by water-proofing material, one of the vertical walls of the pool having a chamber therein and a transparent plate covering the open side of said chamber at the interior of the pool, and subsurface illuminating means for the pool arranged entirely at the inner side of the water-proof backing for the pool wall, said means including a light source, and means arranged in said chamber for refracting light rays emanating from said source and projecting the same laterally through said transparent plate into the pool in the colors of the spectrum.

14. A swimming pool structure having its walls backed by water-proofing material, one of the vertical walls of the pool having a chamber therein opening into the pool and receiving water therefrom, subsurface illuminating means for the pool arranged entirely at the inner side of the water-proof backing for the pool wall, said means including a light source, and means arranged within said chamber receiving light from said source and embodying light refracting prisms for disseminating light in the form of a plurality of light beams projected over a comparatively extensive area into the pool water.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

JOHN FRANCIS BOORAEM.