N° 18,106 A.D. 1904

Date of Application, 20th Aug., 1904
Complete Specification Left, 11th May, 1905—Accepted, 15th June, 1905

PROVISIONAL SPECIFICATION.

"An Automatic Gas Buoy."

I, THOMAS LEOPOLD WILLSON, of 188 Metcalfe Street, in the City of Ottawa, in the County of Carleton, Province of Ontario, Dominion of Canada, Electrician, do hereby declare the nature of this invention to be as follows:—

My invention relates to improvements in automatic gas buoys, and the objects of my invention are to devise a combined buoy, gas generator and burner so arranged that when once charged with gas producing material it will automatically operate for an extended period of time, further objects being to provide convenient means for causing the operation to cease during charging and to provide means for preventing the movement of the water compressing and rarifying the gas in the generator; and it consists essentially of a floatation chamber of any suitable form, an acetylene gas generator located centrally therein, a grate dividing the generator chamber into two portions, a valve located at the bottom of the said chamber and adapted when open to permit the entrance of the water forced therein by the hydrostatic pressure of the surrounding water, an outlet at the top of the generating chamber, and suitable means for burning the gas generated; the various parts of the device being constructed and arranged in detail as hereinafter more particularly described.

The drawing shows a sectional view through the centre of my gas buoy.

It is to be understood that although the present apparatus is described with reference to the use of calcium carbide CaC_2 other metallic carbides such as barium carbide may be used in place thereof.

Referring to the drawings *a* is the gas generator and *b* is the floatation chamber in which the said generator is centrally located. *c* is the grate located near the bottom of the chamber *a*. *d* is the valve located at the bottom of the chamber *a* and d^1 is the valve seat for the same. *e* is an auxiliary bottom secured to the gas chamber *a* by suitable means such as the screws e^1 and located below the valve *d* and provided with a constricted opening e^2. This bottom is made of sufficient weight to ballast the buoy and keep it in an upright position. *f* is a gas lamp or burner connected to an opening f^1 in the top of the gas chamber by a pipe *g* or other suitable means. A reducing valve is provided in connection with this lamp to suitably reduce the pressure for burning.

The generator *a* is made of any suitable shape, the form I have shown being that of an upright cylinder. *h* is a rod connected to the valve *d*. This rod extends upwardly through the top of the cover *i*. The end of the rod is provided with threads and a nut h^1 is screwed thereon. This nut is adapted to abut a shoulder i^1 provided on the cover. It will thus be seen that the valve may be raised or lowered by screwing or unscrewing the nut h^1. A cap i^2 is adapted to fit over this nut and screw on the shoulder i^1.

j is a hollow cylinder adapted to fit over the rod *h* and protect it from the action of the calcium carbide. A hole i^3 is provided in the cover whereby the gas producing material may be introduced into the generator. A cover i^4 is provided for the said opening.

[*Price* 8*d*.]

The floatation chamber *b* is of any suitable shape, that shown being that of an annulus substantially rectangular in section. It is made of sufficient size to support the weight of the whole buoy when placed in the water. In operation the buoy is secured in the position desired by means of an anchor secured to the buoy by suitable means such as the anchor chain *k* secured to the lug k^1.

In starting the apparatus the gas chamber is empty, the valve *d* being closed and so shutting off the water. The calcium carbide is then introduced into the chamber *a* through the hole i^3 filling it to any desired level. The cover i^4 is then placed over the opening i^3 and the valve *d* opened.

As the opening e^2 is a considerable distance below the level of the body of water in which the buoy is placed the water will be forced into the chamber by the hydrostatic pressure. In the course of time it will come into contact with the calcium carbide above the grate *c* and at once will begin the generation of acetylene gas. The generated gas flows through the pipes and lamp, expelling all the air. The lamp is not lighted until the acetylene gas appears of full strength. The lamp is then lighted and the apparatus is ready for regular operation. As the gas is rapidly given off by the decomposition of the carbide it soon generates a pressure within the apparatus and as soon as this pressure exceeds the hydrostatic pressure due to the outside level of the water some of the water begins to be expelled from the generator, the water being finally forced out of contact with the carbide. It is to be understood that the generation of gas continues for a considerable time after the water level has been depressed below the mass of the carbide since a little water remains at the surface adhering to the lumps of carbide or caught in the depressions therein, so that the generation of gas is continued although at a reduced rate after the water has been expelled. As this gas burns away the pressure is lowered and the water level rises in the generator accordingly until it finally again comes in contact with the carbide and a renew generation of gas occurs with a considerable increase in its pressure and a consequent forcing down of the water level. This intermittent operation continues as long as the apparatus is in use.

It may here be pointed out that the constricted opening e^2 in the bottom *e* prevents the motion of the waves in rough weather from withdrawing the water quickly from the inside thus rarifying the gas contained therein. In a similar manner it prevents the gas being compressed. Without this opening the gas would be alternatively compressed and rarified on each motion of the waves.

When it is desired to refill the generator the cap i^1 is removed, the nut h^1 tightened, consequently raising the valve *d* and causing the admission of water to cease. The cover i^4 is then taken off and the calcium carbide introduced through the opening i^3. The cover is then replaced and the valve *d* opened and the operation continued as before.

It may here be mentioned that in certain cases the valve *d* may be dispensed with. In these cases when it is desired to refill it, the buoy is lifted up in the water so that the grate is above the water level while recharging. This operation requires a derrick boat or its equivalent.

The decomposition of the carbide leaves lime as a residuum and this lime is washed out by the water as it rises and falls.

The construction and operation of the invention having been described I will point out the advantages which my apparatus possesses over devices of this class now in use. The principal advantage of the construction which I have shown is to enable the buoy to be entirely automatic in operation and so that when once charged it will operate for an extended period of time without recharging. The advantage of this over former types of buoys is apparent, most of the former types consisting of gas chambers, in which gas is stored at about two hundred pounds per square inch pressure, which necessitates a very much more heavy construction and consequently more expensive. Furthermore in order to re-

charge these a special boat is necessary, thus entailing a very heavy expense, whereas my buoy can be quite easily charged from a row boat.

Another important feature of my invention is the improved auxiliary bottom which prevents the action of the waves compressing or rarifying the gas in the buoy.

Another feature which may be pointed out is the admission valve which permits the water to be shut off and the buoy charged from a row-boat.

I call attention to the fact that to my knowledge there is at present no buoy made which generates its own gas.

Dated this 20th day of August 1904.

HASELTINE, LAKE & Co.
7 & 8 Southampton Buildings, London, W.C.
Agents for the Applicant.

COMPLETE SPECIFICATION.

"An Automatic Gas Buoy"

I, THOMAS LEOPOLD WILLSON, of 188 Metcalfe Street, in the City of Ottawa, in the County of Carleton, Province of Ontario, Dominion of Canada, Electrician, do herey declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to improvements in automatic gas buoys, and the objects of my invention are to devise a combined buoy, gas generator and burner so arranged that when once charged with gas-producing material it will automatically operate for an extended period of time, purging itself of the accumulating lime; further objects are to provide convenient means for causing the operation to cease during charging and to provide means for preventing the movement of the water compressing and rarefying the gas in the generator; and it comprises a floatation chamber of any suitable form, an acetylene gas generator located centrally therein, an openwork support dividing the generator chamber into two portions, a valve located at the bottom of the said chamber and adapted when open to permit the entrance of the water forced therein by the hydrostatic pressure of the surrounding water, an outlet at the top of the generating chamber, and suitable means for burning the gas generated; the various parts of the device being constructed and arranged in detail as hereinafter more particularly described.

The drawing shows a sectional view through the center of my gas buoy.

It is to be understood that although the present apparatus is described with reference to the use of calcium carbide $Ca\,C_2$ other metallic carbides such as barium carbide may be used in place thereof.

Referring to the drawings, A is the gas generator and B is the floatation chamber in which the said generator is centrally located. C is the openwork support for the carbide, made best as a grate, located near the bottom of the chamber A. The parts are so arranged that the buoy floats with the carbide support below the level of the water, so that the water rising through a constricted opening in the bottom tends to submerge the lowest portion of the carbide. The lower part of the generator is provided beneath the grate with a partition D^1 having an opening or valve-seat *d* which may be closed by a valve D. E is a ballast weight secured to the gas chamber A by suitable

means such as the screws e^1 and adapted to ballast the buoy and keep it in an upright position. The bottom opening *e* is preferably formed in this weight. F is a gas lamp or burner connected to an opening *f* in the top of the gas chamber by a pipe G or other suitable means A reducing valve is provided in connection with this lamp to suitably reduce the pressure for burning.

The generator A is made of any suitable shape, the form shown being that of an upright cylinder. H is a rod connected to the valve D. This rod extends upwardly through the top of the cover I. The end of the rod is provided with threads and a nut *h* is screwed thereon. This nut seats on a shoulder on the cover, so that the valve may be raised or lowered by screwing or unscrewing the nut A cap i^1 is adapted to fit over this nut and screw on the boss *i*.

J is a tube adapted to fit over the rod H and protect it from the action of the calcium carbide. This tube may be secured to the cover by any suitable means such as screwing it into the cover. A hole i^2 is provided in the cover whereby the gas-producing material may be introduced into the generator. A cover i^3 is provided for the said opening.

The floatation chamber B is of any suitable shape, that shown being that of an annulus substantially rectangular in section. It is made of sufficient size to support the weight of the whole buoy when placed in the water. In operation the buoy is secured in the position desired by means of an anchor secured to the buoy by suitable means such as the anchor chain K secured to the lug *k*

In starting the apparatus the gas chamber is empty, the valve D being closed and so shutting off the water. The calcium carbide is then introduced into the chamber A through the hole i^2, filling it to any desired level. The cover i^3 is then placed over the opening i^2 and the valve D opened.

As the opening *e* is a considerable distance below the level of the body of water in which the buoy is placed the water will be forced into the chamber by the hydrostatic pressure. In the course of time it will come into contact with the calcium carbide above the grate C and at once will begin the generation of acetylene gas. The generated gas flows through the pipes and lamp, expelling all the air. The lamp should not be lighted until the acetylene gas appears of full strength. The lamp is then lighted and the apparatus is ready for regular operation. As the gas is rapidly given off by the decomposition of the carbide it soon generates a pressure within the apparatus, and as soon as this pressure exceeds the hydrostatic pressure due to the outside level of the water some of the water begins to be expelled from the generator, the water being finally forced out of contact with the carbide. It is to be understood that the generation of gas continues for a considerable time after the water level has been depressed below the mass of the carbide, since a little water remains at the surface adhering to the lumps of carbide or caught in the depressions therein so that the generation of gas is continued although at a reduced rate after the water has been expelled. As this gas burns away the pressure is lowered and the water level rises in the generator accordingly until it finally again comes in contact with the carbide and a renewed generation of gas occurs with a considerable increase in its pressure and a consequent forcing down of the water level. This intermittent operation continues as long as the apparatus is in use.

The decomposition of the carbide leaves lime as a residuum and this lime is washed out by the water as it rises and falls. This automatic purging out of the residual lime is a characteristic and novel feature of my invention. All previous acetylene generators have required to be cleaned out at intervals, which is a very difficult and troublesome operation. In my buoy the successive inflow and outflow of water through the bottom opening keeps washing out the lime which falls through the openings of the grate. This lime falls on the partition D^1 or on the bottom E, any lumps of carbide which may fall before being wholly decomposed being retained here until the decomposition is completed.

The constricted opening e in the bottom prevents the motion of the waves in rough weather from withdrawing the water quickly from the inside, thus rarefying the gas contained therein. In a similar manner it prevents the gas being compressed. Without such constricted opening the gas would be alternatively compressed and rarefied on each motion of the waves.

When it is desired to refill the generator the cap i^1 is removed, the nut h tightened, consequently raising the valve D and causing the admission of water to cease. The cover i^3 is then taken off. If the water has risen above the grate, it is pumped to below that level. The calcium carbide is introduced through the opening i^2, the cover is then replaced and the valve D opened. The operation then continues as before.

In certain cases the valve D may be dispensed with. In such case when it is desired to refill the buoy it is lifted up in the water so that the grate is above the water level while recharging. This operation requires a derrick boat or its equivalent.

It will thus be seen that I have invented a gas buoy which is automatic in operation and once charged will remain so for a considerable period of time. Furthermore it may be recharged very easily with no expensive apparatus. The advantage of this over former types of buoys is apparent, most of the previous types consisting of gas chambers in which gas is stored at about two hundred pounds per square inch pressure, which necessitates a very much more heavy construction and consequently more expensive.

Furthermore in order to recharge these a special boat is necessary provided with generating or compressing apparatus, thus entailing a very heavy expense, whereas my buoy can be quite easily charged from a rowboat.

It is to be understood that in constructing my buoy various changes may be made in its details without materially departing from the spirit of my invention.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:

1. A gas buoy provided with means for carrying a supply of gas-generating material, and adapted to float with said material normally below the level of the surrounding water, and adapted to discharge the residuum automatically.

2. A gas buoy having a generating chamber and an open-work support for carbide therein, said buoy adapted to float with said support below the level of the surrounding water, said chamber closed above said support and having an opening beneath in normally constant communication with the surrounding water, and adapted to automatically discharge the residuum by the circulation of water through said opening.

3. A gas buoy provided with a generating chamber having a support for gas generating material, said buoy adapted to float with said support normally below the level of the surrounding water, and having a clear passage from beneath said support downward to the exterior adapted to discharge the residuum into the surrounding water automatically.

4. A gas buoy provided with an internal support for a gas-generating material, and adapted to float with said support normally below the level of the surrounding water, and having an open passage downward from beneath said support to the exterior adapted to permit the water to wash freely in and out to wet the gas generating material and to carry away the residuum.

5. A gas buoy provided with a generating chamber and a support therein for gas generating material, and adapted to float with said support normally below the level of the surrounding water, and a substantially horizontal partition below said support for retaining small lumps temporarily to complete their decomposition, and having an opening adapted to subsequently automatically discharge the residuum.

6. A gas buoy provided with a generating chamber and a support therein

for gas generating material, and adapted to float with said support normally below the level of the surrounding water, and having a downward passage from beneath the support to the surrounding water of suitable size to discharge the residuum freely and automatically and so small as to prevent too sudden rushing of water in or out through said passage.

7. A gas buoy provided with a generating chamber and a support therein for gas generating material, and having a valved passage below said support for the admission of the surrounding water, and an auxiliary apertured bottom below said valve.

8. A gas buoy provided with a generating chamber and a support therein for gas generating material, and adapted to float with said support normally below the level of the surrounding water, and having a valve operable from above the surrounding water level, whereby the water from the sea may be cut off to permit recharging.

9. A gas buoy provided with a generating chamber and a support therein for gas generating material and adapted to float with said support normally below the level of the surrounding water, and having a downward passage from beneath the support to the surrounding water, a valve for closing said passage, and an operating rod for said valve passing through said buoy to a point accessible from above the surrounding water level.

10. A gas buoy provided with a generating chamber and a support therein for gas generating material, and having an aperture below said material for discharging the residuum, and a conical valve D for said opening.

11. In a gas buoy, a floatation chamber, a generating chamber, a weight at the bottom adapted to hold the buoy upright and provided with an orifice for admitting water to the generating chamber, and a gas lamp on the top connected with the generating chamber.

Dated this 11th day of May 1905.

HASELTINE, LAKE & Co.
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Agents for the Applicant.

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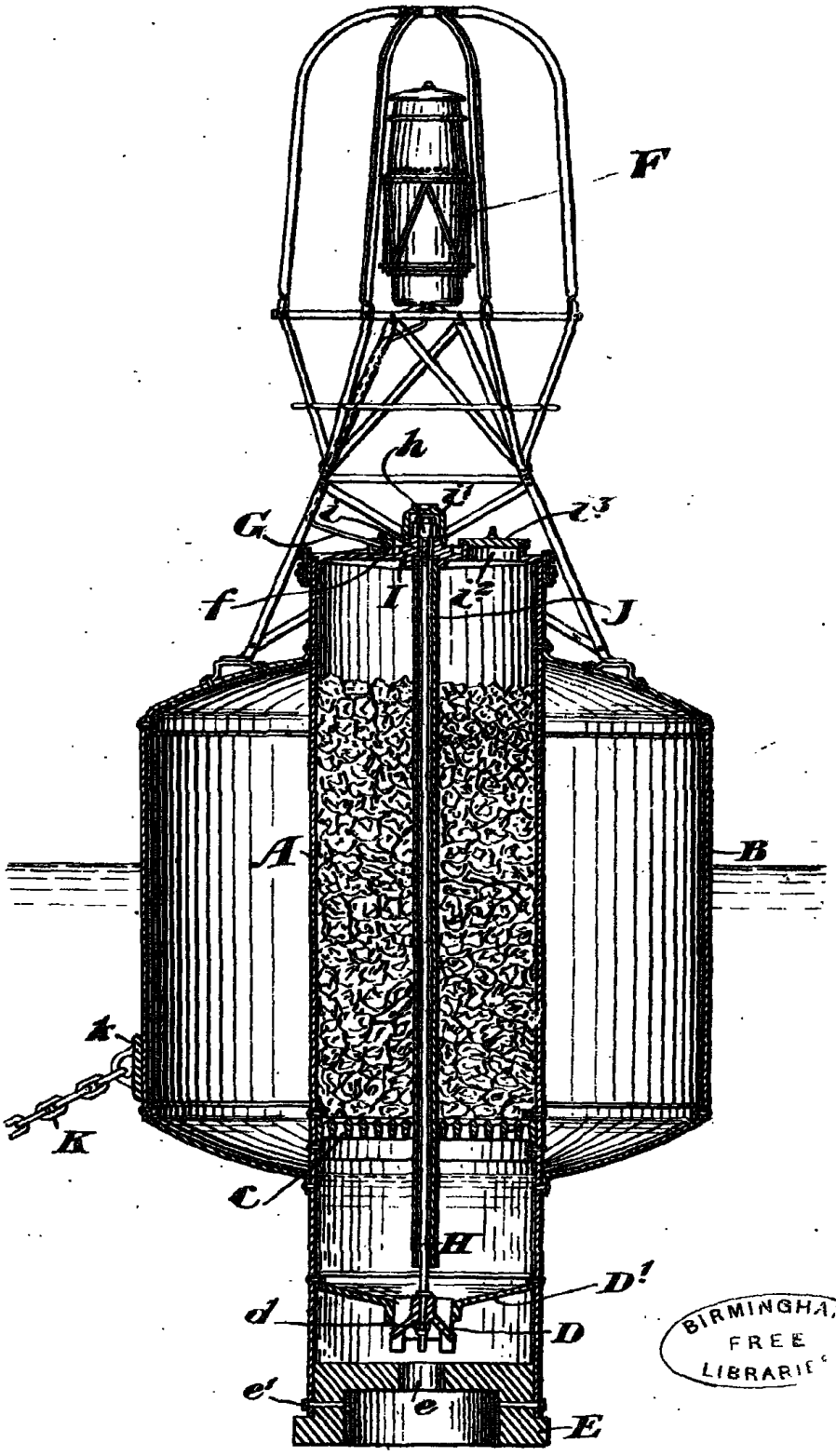
WILLSON'S Complete Specification.

(1 SHEET)

[This Drawing is a reproduction of the Original on a reduced scale.]



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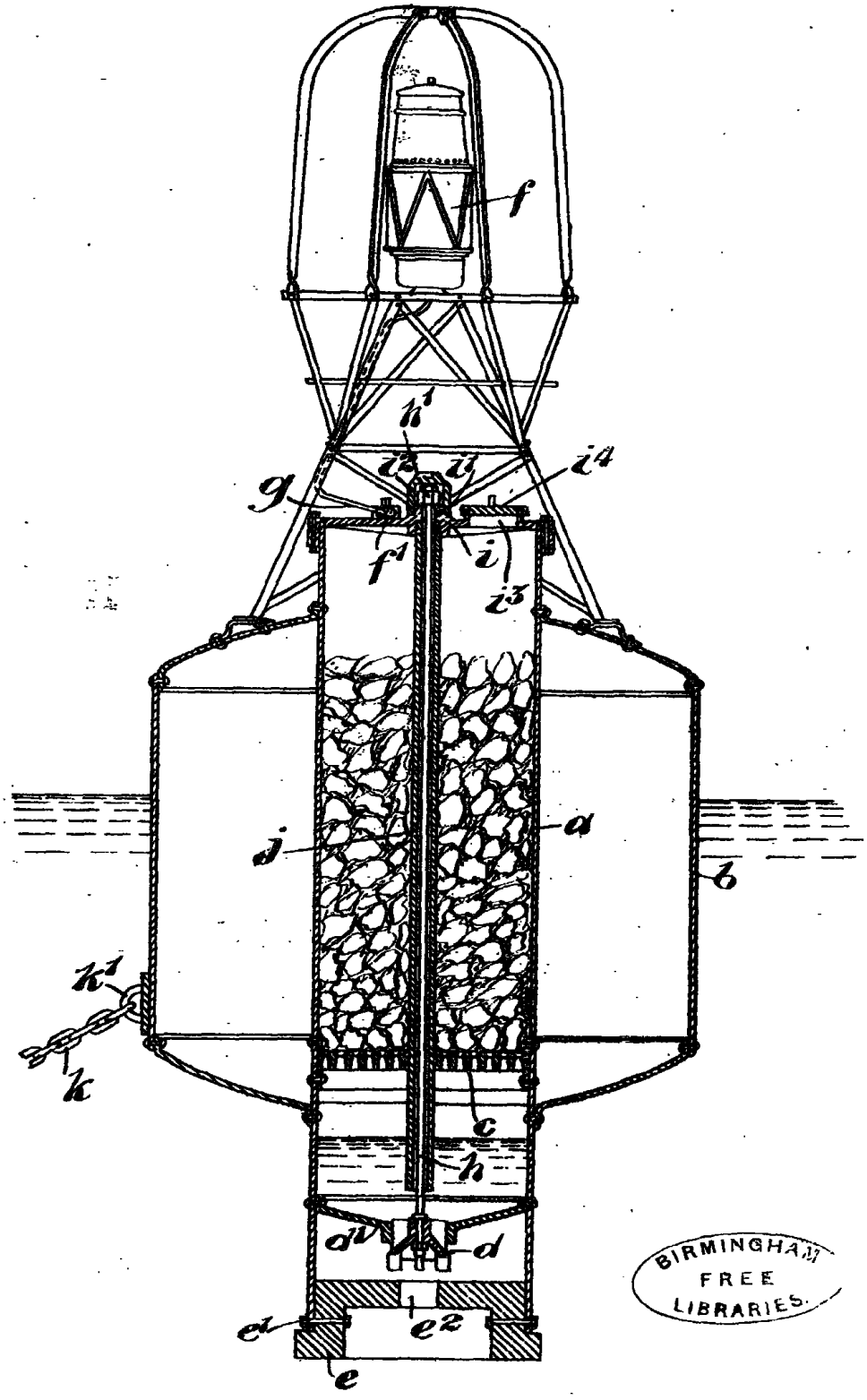
WILLSON'S PROVISIONAL SPECIFICATION. (1 SHEET)



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