(No Model.)

N. F. D. BARBIER.

Luminous Signal Buoy.

No. 237,156. Patented Feb. 1, 1881.

Fig. 1.

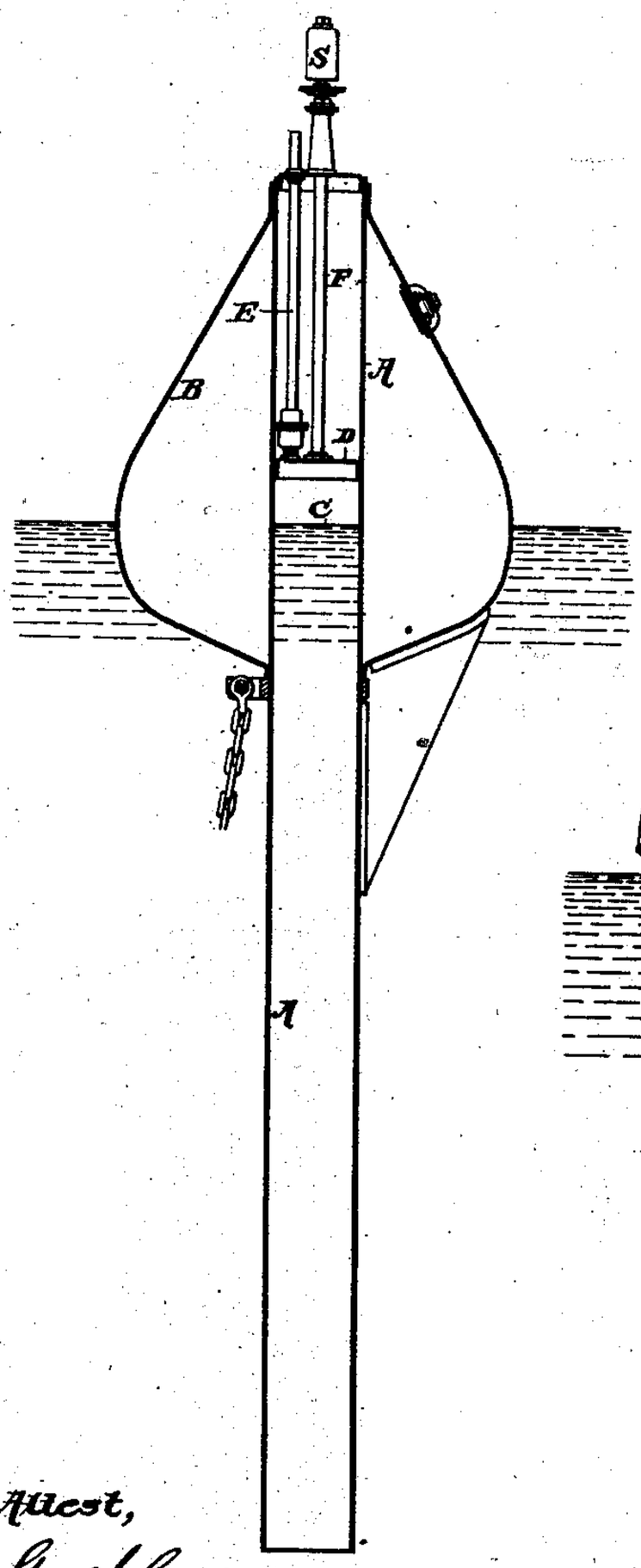
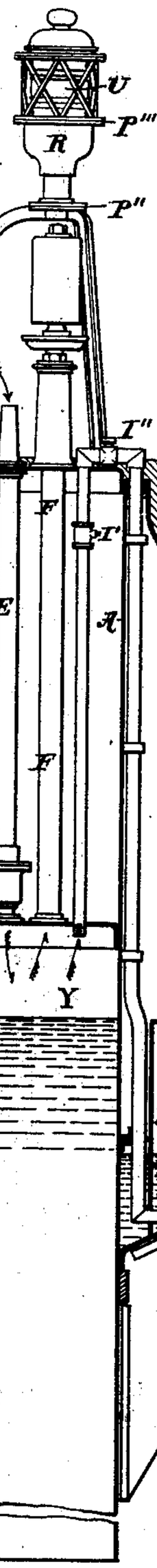


Fig. 2.



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UNITED STATES PATENT OFFICE.

NICOLAS F. D. BARBIER, OF PARIS, FRANCE, ASSIGNOR OF ONE-HALF TO STANISLAS TRANQUILLE FENESTRE, OF SAME PLACE.

LUMINOUS SIGNAL-BUOY.

SPECIFICATION forming part of Letters Patent No. 237,156, dated February 1, 1881.

Application filed November 16, 1880. (No model.) Patented in France June 19, 1880.

To all whom it may concern:

Be it known that I, NICOLAS FRÉDERIC DESIRÉ BARBIER, of Paris, France, have invented certain new and useful Improvements in Automatic Luminous Signal-Buoys; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the two figures of the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

For several years attempts have been made to provide buoys with lights, and in most cases compressed illuminating-gas has been used for this purpose; but notwithstanding the favorable results which have been obtained in some instances, the application of such buoys seems to have remained confined to some special cases, while considerable difficulties militate against its general introduction. These difficulties arise, principally, in the production and the compression of the gas, and, further, in its transportation to the buoys.

The object of the present invention is to overcome these difficulties; and it consists, substantially, in the automatic production of the gas in the buoy itself at the ratio of its consumption. I make use of the motion of the waves for obtaining this end. The illuminating-gas which I use is simply air carbureted by its passage through hydrocarbon liquids of appropriate density, which is sometimes denominated "gasoline," and which answers all the purposes of permanent illuminating-gas. For this purpose the buoy is constructed in such a manner that it serves as a recipient for the liquid hydrocarbons. It contains, further, a suitable arrangement for effecting the saturation of the air with the said liquid hydrocarbons, and contains a space for storing the generated gas until it is consumed. Besides the buoy is provided with an apparatus acting mechanically—for instance, with a pump—which serves for introducing the air necessary for the generation of the gas, and, finally, with a burner provided with a regulator.

I believe the best method of introducing the air into the buoy to be that which has been used already in Courtenay's automatic signal-buoy, in which, as is well known, sound is produced by first introducing exterior air into the buoy, and, secondly, by letting this air escape therefrom through a whistle, both these actions being produced by the motion of the waves.

Figure 1 represents a Courtenay's automatic signal-buoy constructed in this manner, and Fig. 2 the same buoy provided with a light or illuminating apparatus which is fed with carbureted air.

The operation of Courtenay's buoy is as follows: The waves, as is well-known, are formed only on the surface of the water, while at a certain depth the water is completely still. Through the buoy B, Fig. 1, passes a pipe, A, the lower extremity of which is open. In consequence, the level, C, of the water in the pipe A will constantly be about the same as the average level of the sea. Somewhat above this level a diaphragm, D, is arranged in the pipe A, upon which are fixed two pipes, E and F. The first one of these pipes, E, is in communication with the exterior air, and provided with a non-return valve, while upon the extremity of the second pipe, F, is mounted a whistle, S. It will be seen that as soon as the buoy is raised by a wave the space inclosed by the pipe A, the diaphragm D, and the level of the water C will be increased in capacity. The air enters through the pipe E into the said space, and is violently forced out again through the pipe F and the whistle S when the buoy sinks. It follows that with each wave that strikes the buoy a sound is produced by the whistle.

In order to transform such a buoy producing acoustic signals into a light-buoy, I add thereto the following devices. (See Fig. 2.)

The interior of the buoy is divided by a diaphragm, M, into two compartments, L and J, the lower one of which serves for the reception of a liquid hydrocarbon of suitable specific gravity.

O is a tube for introducing the liquid hydrocarbon in the reservoir L. It is provided with a suitable closing device outside the buoy.

From the chamber Y in the pipe A a third pipe, I, (in addition to the pipes E and F,) leads first upward to the top of the buoy, where it is provided with a check-valve, I′, and outside

the buoy with a regulating-cock, I″, and thence returning into the buoy penetrates through the diaphragm M, and its extremity is immersed in the liquid contained in the chamber L. The air compressed in the chamber Y each time the buoy sinks passes, consequently, partially through the pipe I, the lower extremity of which is bent upward, as shown, into the saturating apparatus H, which is partly immersed in the liquid hydrocarbon. It traverses the perforated diaphragms N, and is thereby more thoroughly impregnated with the liquid, and is discharged in the reservoir J in the shape or form of a combustible gas. A pipe, P, leads from this chamber into the lantern U, fixed above the buoy, and in which a suitable burner is arranged.

R is a regulator of any suitable construction, placed on the pipe P, immediately below the burner, serving to give uniformity of pressure to the gas consumed by the burner above it. Z is an outer coating of any appropriate material which is a bad conductor of heat. Furthermore, safety-diaphragms of wire-gauze, P′ P″ P‴, are arranged in the pipe P, in order to prevent any danger of explosion.

The lantern itself may be of any suitable construction, and is preferably provided with suitable dioptric glasses, which may be protected by a suitable lattice-work.

It is an ascertained fact that Courtenay's buoy operates in a perfect manner when the waves run very high, as well as when the water is only slightly ruffled. From this fact it may be concluded that with each wave a certain amount of air will be introduced into the buoy and transformed into illuminating-gas. If it be considered, now, that the undulations increase in number in proportion to the shortness of the waves, and that the force of compression is due to the height of the column of water in the pipe A, and to the weight of the buoy with its chain, and which force is nearly constant, it may be concluded as a final result that the quantity of air introduced will be also nearly constant. Consequently it may be possible to so set the regulating-cock I″ in the pipe I that the introduction of air and the production of gas on one side and the consumption of gas on the other side will constantly be in a uniform ratio, so that the regulator R becomes superfluous. I believe, however, that in order to insure a constantly-uniform intensity of the light it is preferable to introduce a surplus of air—that is to say, to compress the gas produced by the pressure of the column of water in the pipe A, and to let the gas arrive at the place of its combustion under a much lower pressure, which is constantly kept uniform by means of the regulator. In this manner there will be always contained in the buoy a sufficient supply of gas to feed the burner in case such sufficient supply of air be interrupted in any manner for a short period.

If the burner is so regulated that it consumes, for instance, one liter of the liquid hydrocarbon in twenty-four hours, it will be easily seen that the light of the buoy may be kept burning for a considerable period, as the buoy can be so constructed that it can hold easily five hundred to one thousand liters, or more, of the liquid.

The above-described method, taken from Courtenay's buoy, of introducing the air seems to me very simple and practical. I do not, however, confine myself solely to it, as any other mechanical arrangement operated by the motion of the waves may be used—such, for instance, as a cylinder and piston, bellows, &c.

Also other details—for instance, the construction of the saturating apparatus H—may be modified in various ways without departing from the principle of the invention.

I claim as my invention—

1. The means for supplying the lantern of a signal-buoy with illuminating-gas, the same consisting of a chamber for containing liquid hydrocarbon, and an automatic air apparatus, substantially as described, with a pipe for conveying the air through the hydrocarbon in said chamber, and a pipe for conducting the gas produced to the lantern, all substantially as described.

2. The combination, with a buoy divided into compartments J and L, and having a pipe, as A, closed by a diaphragm at a point above the water-level, so as to provide an air-chamber, Y, with which an air-induction pipe, as E, communicates, of an air-conducting pipe, as I, leading into the compartment L, and a pipe, as O, leading from the compartment J to a lantern, U, substantially as described.

3. The combination, with a buoy divided into compartments J and L, and having a pipe, as A, closed by a diaphragm at a point above the water-level, so as to provide an air-chamber, Y, with which an air-induction pipe, as E, communicates, of an air-eduction pipe, as F, leading to a whistle, an air-pipe, as I, leading to the compartment L, and a pipe, as O, leading from the compartment L to a lantern, substantially as described.

In witness whereof I have hereunto set my hand this 23d day of October, 1880.

N. F. D. BARBIER.

Witnesses:
ROBT. M. HOOPER,
R. H. BRANDO.