

E. C. WOOD.

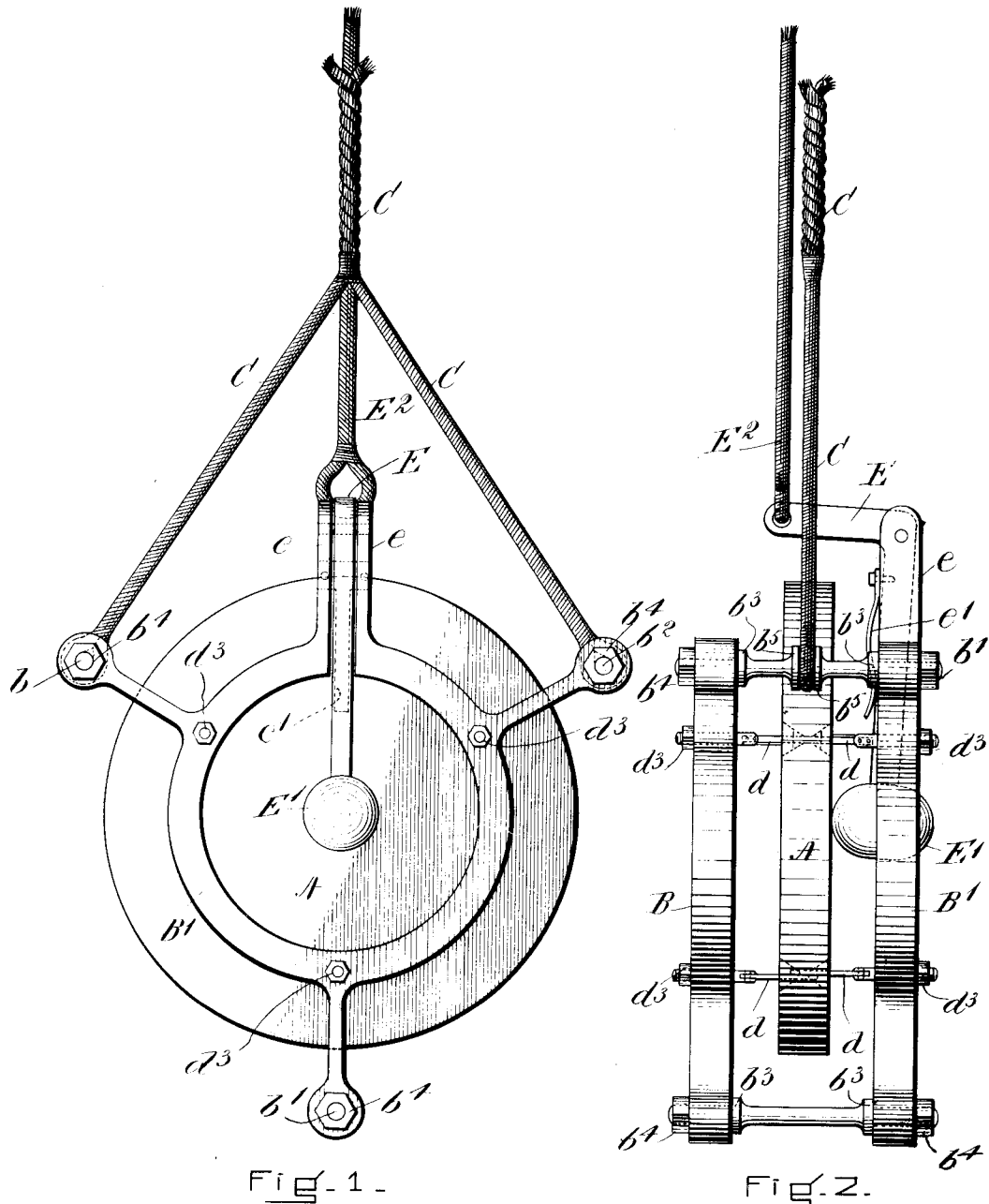
SOUNDER.

APPLICATION FILED NOV 16, 1910.

1,109,811.

Patented Sept. 8, 1914.

3 SHEETS-SHEET 1.



WITNESSES:

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3 SHEETS-SHEET 2.

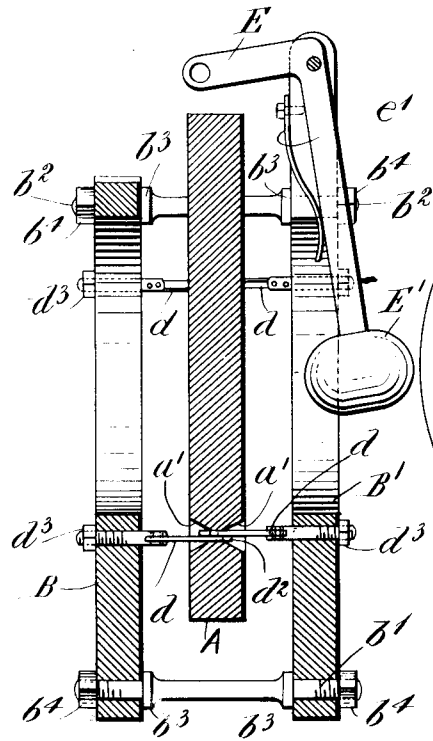


FIG. 3.

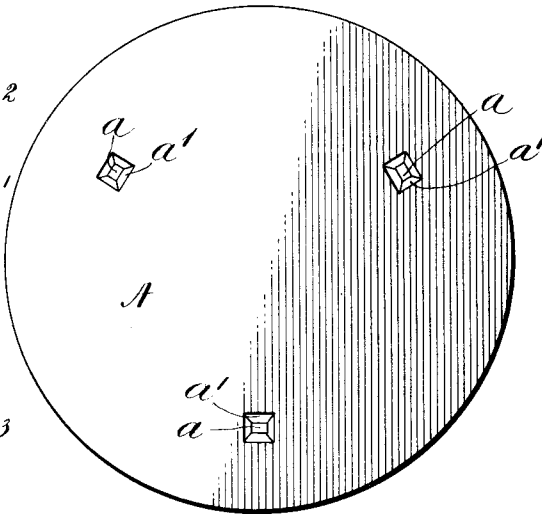


Fig. 4.

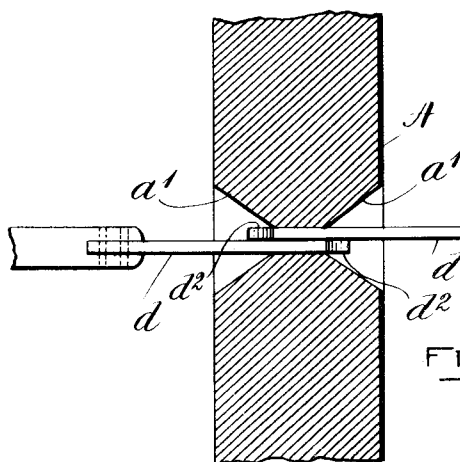


FIG. 5.

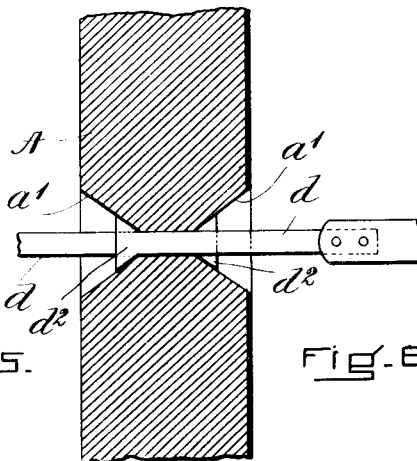


FIG. 6.

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3 SHEETS-SHEET 3.

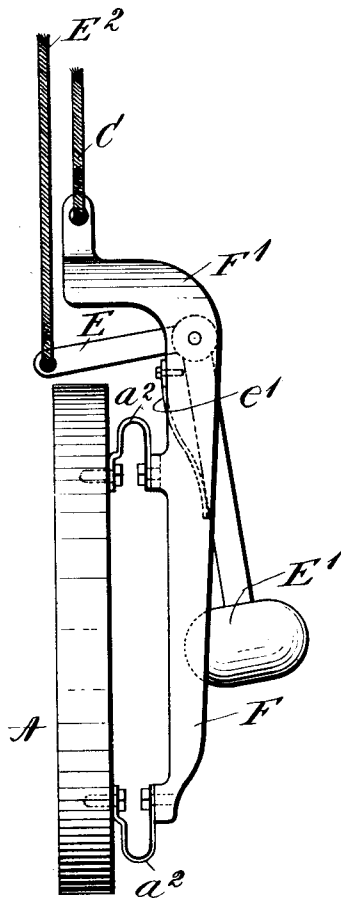


Fig. 7-

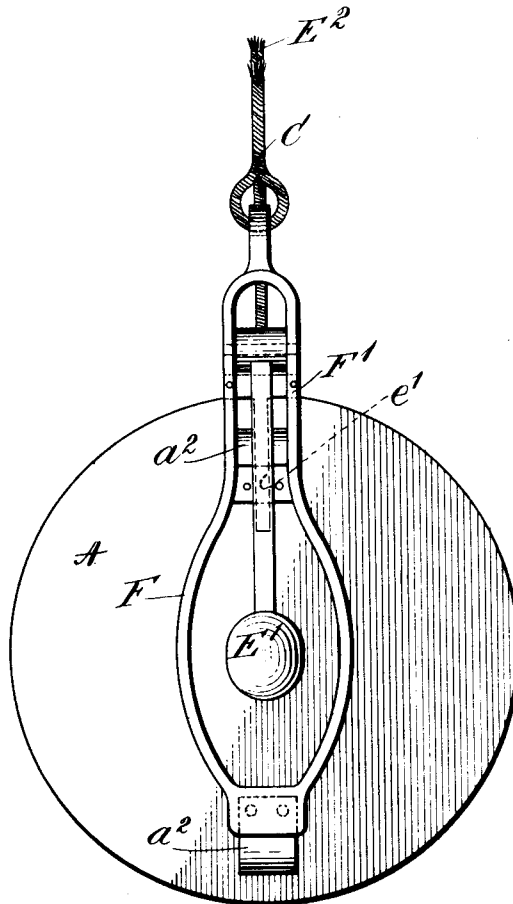


Fig. 8.

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UNITED STATES PATENT OFFICE.

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SOUNDER.

1,109,811.

Specification of Letters Patent.

Patented Sept. 8, 1914.

Application filed November 18, 1910. Serial No. 592,600.

To all whom it may concern:

Be it known that I, EDWARD C. WOOD, of
Somerville, in the county of Middlesex and
State of Massachusetts, a citizen of the
6 United States, have invented a new and
useful Improvement in Sounders, of which
the following is a specification.

The purpose of the present invention is
to secure as a signaling means for subma-
10 rine work a fundamental tone substantially
free from overtones and of greater energy
than has been possible in the devices used
heretofore in this art. For this purpose I
have supported a disk in such a manner
15 that when it is caused to vibrate by a blow
in its center its fundamental tone will sound
substantially free from overtones. A single
circular node will thus be developed and
upon that node I attach supports to the disk
20 in such a way as not to interfere materially
with the natural vibration of the disk, the
clapper or other means of originating vibra-
tions in the disk being hung or supported
so as to originate the vibrations always at
25 the same predetermined spot.

A bell when vibrated delivers a large part
of its vibration to the water inside the bell
where it is not so effective as when delivered
to the water outside as this forms the direct
30 path from the bell to any distant point.
In such a disk the delivering surface with
the exception of the edge, which is of rela-
tively small area, is all exposed to the water
forming the path to the distant point. In
35 other words, in such a disk the effective de-
livering surface is greater than in a bell
of equal weight.

Another practical advantage in this form
of sounder is the fact that the disk is very
40 easily tuned as its pitch is directly propor-
tional to its thickness and inversely pro-
portional to the square of its diameter, so
that by reducing its diameter or its thick-
ness the pitch can be raised or lowered as
45 desired.

My invention will be understood by ref-
erence to the drawings in which are shown
two ways of mounting such a disk and for
convenience the means for setting the disk
50 in vibration is shown as an ordinary bell
clapper.

Figure 1 is a rear elevation, and Fig. 2
a side elevation of a device embodying my

invention, Fig. 3 being a vertical section
of the apparatus as shown in Fig. 2, and 55
Fig. 4 an elevation of the disk with the
supporting mechanism removed. Fig. 5 is
an enlarged section detail showing the means
of attaching the disk to its supports as
shown in Fig. 3, Fig. 6 being a horizontal 60
section showing the same parts as Fig. 5.
Figs. 7 and 8 are modifications which will
be described below, Fig. 7 being a side ele-
vation and Fig. 8 a rear elevation.

The disk in Figs. 1 to 6, inclusive, is 65
lettered A and it may be constructed of
any metal having good vibratory qualities.
This disk as shown in these views is pro-
vided with three openings through it *a*.
These openings are preferably rectangular 70
and are countersunk on each side of the disk,
being provided with surfaces *a*¹ which ap-
proach as they near the interior of the disk.
They are located at points between the cen-
ter and the periphery of the disk and pref- 75
erably at points distant from the center ap-
proximately two-thirds the length of the
radius of the disk, this location giving the
best results because when in the vibration
of the disk it is giving out its fundamental 80
tone without overtones nodes are formed in
the circle, and when thus supported its vi-
brations will not be damped.

As a means of supporting the disk I have
shown a frame comprising spiders B, B¹ 85
having three bolts *b*, *b*¹, *b*², each bolt being
provided with two collars *b*³ against which
the spiders B, B¹ rest and are held by means
of nuts *b*⁴. Two of the bolts have also in-
termediate collars *b*⁵ to provide grooves to 90
receive the supporting ropes C. The means
for supporting the disk between these spi-
ders B, B¹ comprises three pairs of clamp-
ing bolts each preferably made in two parts,
one part being a rod *d* riveted to the other 95
part which is threaded at its outer end to
receive a nut *d*¹. The outer end of each rod
d is provided with a head *d*², its head being
angular to engage the inner walls *a*¹ of
the opening *a* in the disk. When the nuts 100
are set up the heads *d*² are pulled in oppo-
site directions so that they clamp the disk
as near its central plane as is practicable.
Fulcrums are thus formed at points not only
equidistant from the center of the disk but 105
also as nearly as practicable to the center

plane of the disk, thus giving a minimum of damping to the disk when it vibrates. The spider B^1 is not a complete circle but terminates in two arms e between which is pivotally mounted a bell crank lever E carrying a clapper E^1 . The horizontal arm of the lever E is provided with a hole to receive a rope E^2 by which it may be actuated by hand. This of course is a very simple way of actuating the clapper and it will be readily understood that other means may be provided instead as many ways of operating a clapper are known in the art. To hold the clapper off from the disk a spring e^1 is provided which is attached to the two arms e of the spider. This spring is sufficiently strong to hold the clapper back and yet not so strong as to interfere practically with the operation of the clapper by means of the rope or other operating mechanism. As shown in Figs. 2 and 3 the two positions of the clapper will be noticed,—in Fig. 3 it is in position to be operated to strike the disk and in Fig. 2 it is in contact with the disk, striking the blow.

In Figs. 7 and 8 I have shown a modification of my invention in which the disk A is attached to its supporting frame F by means of springs a^2 so that the vibrations of the disk will be damped as little as possible. Two springs only are shown as the frame is shaped to be attached at two points only to the disk, these two points being on a circular node. Within the upper part of the frame is pivotally mounted the lever E carrying the clapper E^1 as before and operated by the rope E^2 . The frame itself has an arm F^1 which projects at right angles to the main portion of the frame and is provided with a supporting rope C or other means for supporting the disk, the length of this arm and consequently the position of the supporting means being such as to cause the apparatus as a whole to hang in a substantially vertical plane.

There are of course other means of supporting a disk about a circular node and which will readily occur to anyone skilled in the art. Various means which are well known have been adopted in this art for causing the vibration of a vibratory body, which is to be vibrated with sufficient energy to originate submarine sound signals. I have shown, however, the simplest construction which now occurs to me and it can be readily utilized to originate signals from shipboard, for example, by lowering the disk overboard and operating the clapper by hand or by lowering the disk into a tank filled with water and clamped to the inside of a ship where the clapper may be operated by hand or otherwise as seems best.

It will be noted that in both the examples shown the lever E carrying the clapper E^1 is mounted in substantially

fixed relation to the disk so that when the lever is moved to cause the clapper to strike the disk the disk will always be struck at its center or other predetermined point.

It will be noted that the above invention calls for a disk free to vibrate both at its center and at its edges, the prime purpose of the invention being to secure a fundamental tone which because of its freedom from overtones is of great carrying power; especially in submarine signaling. It is possible to secure results more or less valuable from a disk free to vibrate both at its edge and at its center which is mounted at other points between its center and its periphery or edge; the best results, however, are secured by mounting the disk in the manner above described.

What I claim as my invention is:—

1. The sounder above described comprising a frame, a disk and means for vibrating said disk, said disk being fixedly attached to said frame at points in a circular node and said disk-vibrating means being mounted upon said frame to act upon said disk at a predetermined point within said circular node.

2. In a device of the kind described, a frame, a disk fixedly attached thereto, and means for exciting vibrations in said disk also mounted on said frame, the attachment of said disk to said frame being in a circular node on said disk whereby when vibrations are excited in said disk by said exciting means the portion of said disk representing said circular node will be held stationary with relation to said frame, and the portion of said disk within and without said node will vibrate in opposite directions about the points of attachment of said disk and frame.

3. The sounder above described comprising a frame, a disk, and means for vibrating said disk, said disk being fixedly attached to said frame at points in a circular node and said disk-vibrating means being mounted upon said frame to act upon said disk at a predetermined point within said circular node in combination with means whereby said sounder may be suspended.

4. The sounder above described comprising a frame, a disk fixedly attached thereto at points in a nodal circle, a clapper arm mounted on said frame and carrying a clapper, means for operating said clapper arm and means for supporting said sounder whereby said sounder may be submerged and said clapper operated to give a signal.

5. The sounder above described comprising a disk, a frame, means for vibrating said disk, and means for supporting said disk in said frame, said disk being provided with openings therethrough and said supporting means comprising clamping bolts passing through said openings in opposite direc-

tions whereby the heads of said bolts engage opposite sides of said disk, said disk being clamped between the heads of said bolts.

5 6. The sounder above described comprising a disk, a frame, means for vibrating said disk, and means for supporting said disk in said frame with the points of support lying in a plane parallel to and located

between the faces of the disk whereby fulcrums are formed about which said disk 10 may vibrate.

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Witnesses:

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