

Sept. 25, 1934.

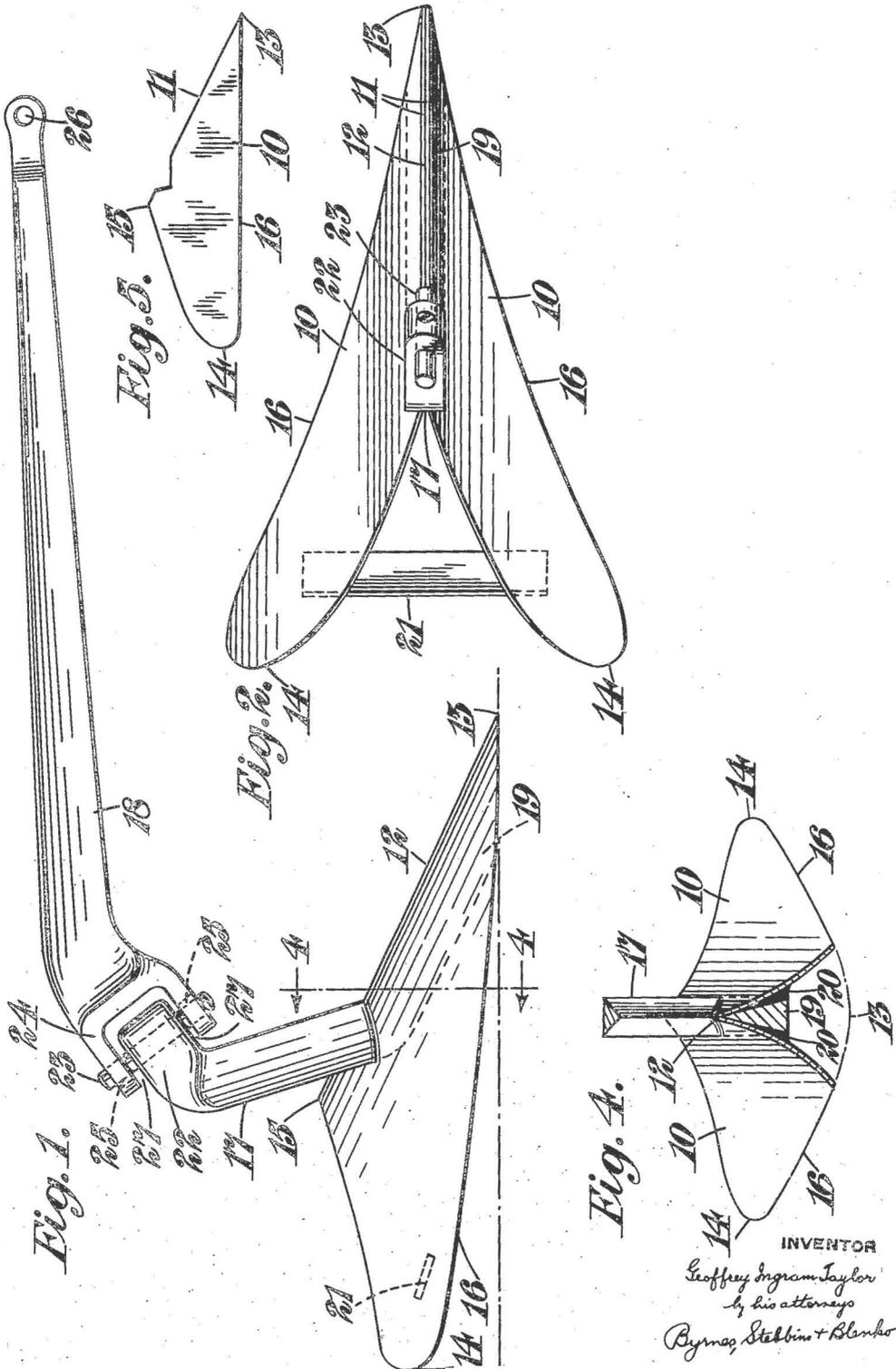
G. I. TAYLOR

1,974,933

ANCHOR

Filed Feb. 28, 1934

2 Sheets-Sheet 1



INVENTOR
Geoffrey Ingram Taylor
by his attorneys
Bymes, Stebbins + Blenko

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2 Sheets-Sheet 2

Fig. 3.

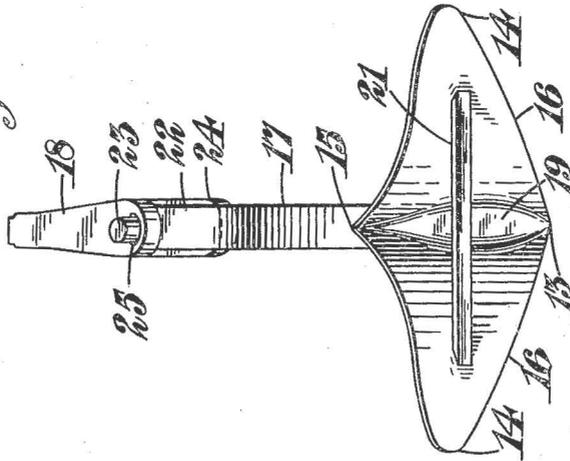
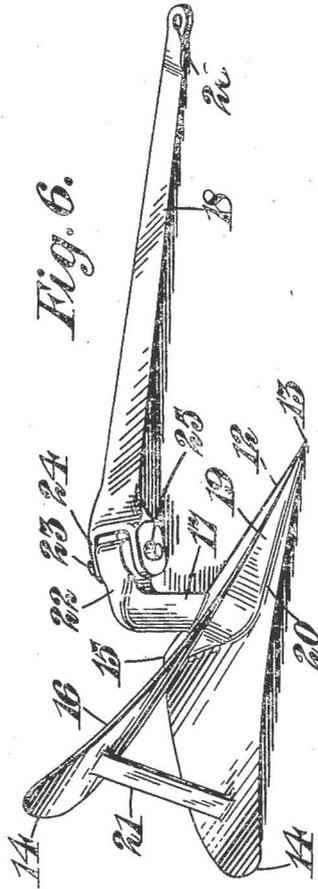


Fig. 6.



INVENTOR
Geoffrey Ingram Taylor
by his attorneys
Byrnes, Stebbins & Blankens

UNITED STATES PATENT OFFICE

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ANCHOR

Geoffrey Ingram Taylor, Cambridge, England

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11 Claims. (Cl. 114—203)

This invention comprises improvements in or relating to anchors for mooring yachts and ships generally, and may also be used for the mooring of aircraft on water. The main object of the invention is to provide an anchor having a higher drag/weight factor than is obtainable with the standard anchors at present in use.

The invention provides an anchor comprising a fluke in the form of a pointed structure symmetrical about a central plane which is vertical in the operative position of the anchor, and a shank which is pivotally articulated to the fluke (or a part rigid with the fluke) for swinging movement with respect thereto about an axis which lies in the plane of symmetry of the fluke and aslant the line of pull of the cable.

In its preferred form the anchor comprises a fluke in the general form of a double-bladed plough-share symmetrical about a central ridge formed by the junction of the two blades and sloping downwardly towards a point, and a shank formed by two rigid portions, whereof one (the fixed portion) is rigidly fixed to the fluke and extends outwardly from the central ridge in the plane of symmetry, and the other (the hinged portion) adapted to extend forwardly of the fluke, is pivotally attached to the rigid portion for relative swinging movement about an axis which lies in the aforesaid plane of symmetry and intersects the ridge in the region of the point.

The term "in the region of the point" is intended to convey that the axis intersects the ridge at a position in the length of the anchor which is nearer the point than the rear ends of the blades. It may, for example, intersect the ridge at a position spaced apart from the point by a distance equal to about one third of the length of the fluke.

In one construction the pivot between the fixed and hinged portions of the shank is disposed obliquely in a forward direction towards the pivot. It is preferred that the weight distribution of the anchor be such that the centre of gravity of the unit comprising the fluke and the fixed portion of the shank shall lie substantially forward of a line between the pivot and the rear end of either blade.

According to a feature of the invention the outer surface of each blade of the fluke may conform to a section of a cylindrical surface formed by generators parallel to the central ridge. The blades of the fluke may be formed by sheet-metal plates bent to the required configuration and welded together along the ridge. The fixed portion of the shank (conveniently of V-section

metal) may be carried through an aperture in the walls of the fluke, and have its inner end shaped to lie in the angle between the blades and to extend towards the point, being welded in position and constituting a reinforcement for the blades. Preferably the pivotal connection between the two portions of the shank is arranged to provide considerable play, particularly in a direction along the length of the pivotal axis.

An example embodying the foregoing features of the invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 is a side elevation of the anchor,

Figure 2 is a plan of the fluke,

Figure 3 is an end elevation of the anchor looking on the rear end of the fluke,

Figure 4 is a section on the line 4—4 of Figure 1,

Figure 5 is a developed view of a plate which constitutes one of the fluke blades, and

Figure 6 is a perspective view showing the position which the anchor will usually assume when dropped on the sea-bed (on a smaller scale than the other figures).

Like reference numerals indicate like parts throughout the figures.

The fluke is built up from two sheet-metal plates 10 of the triangular form shown in Figure 5. The two plates 10 are first bent to a particular configuration and then welded together along their corresponding marginal edges 11 to form a structure similar to a double-bladed plough-share. The configuration to which each plate 10 is bent is such that each forms, or approximates to, a section of a cylindrical surface formed by generators parallel with the central ridge 12 produced by the union of the edges 11 of the two blades. As shown in Figure 1, the blades are wing-shaped, meeting at a point 13 at the forward end of the ridge and diverging from one another at their rear ends 14. The upper edge of each blade from the rear end 15 of the ridge to the extremity 14 of the blade extends in a smooth concave curve. The lower edge 16 of each blade is curved upwardly towards its rear end, as shown in Figure 1. Assuming the fluke to rest in an upright position upon the sea-bed, the ridge 12 extends upwardly and backwardly from the point at an angle of approximately 25° to the ground, and the fluke rests upon the two curved lower edges of the blades.

The shank of the anchor is formed in two rigid portions, namely a fixed portion 17 and a hinged portion 18, both of which are constituted by V-section bars. The fixed portion 17 is arranged to extend through an aperture in the walls of the

fluke near the rear end 15 of the ridge and at its inner end 19 is shaped to lie in the angle between the inner surfaces of the two blades and to extend towards the point. The part 19 of the fixed shank portion 17 is welded in position at 20 (see Figure 4) and constitutes a reinforcement for the blades. The fluke is further reinforced by a cross-bar 21 (Figures 2 and 3) extending between the rear ends of the blades and secured thereto by welding.

As will be seen, the fluke is symmetrical about a central plane containing the ridge 12, and the fixed shank portion 17 is located in the plane of symmetry. The outer end of the portion 17 extends upwardly and rearwardly at an angle of 133° to the ridge. At its upper extremity 22 it is bent forwardly at an angle of 110° and there carries a pivot pin 23, the axis of which lies in the plane of symmetry of the fluke and intersects the ridge at a position spaced inwardly a short distance from the point 13. The angle between the axis of the pivot and the ground level (in the upright position of the fluke) is 52°.

The hinged portion 18 of the shank has a forked extremity 24, the forked arms being provided with apertures 25 within which the ends of the pivot pin 23 are received. From the forked end 24 the hinged portion 18 extends forwardly of the fluke (Figure 1) and at its forward extremity is provided with an eye 26 to take the mooring cable. The holes 25 for the pivot pin are larger in diameter than that of the pin itself—for example, the pin may be $\frac{7}{8}$ " and the holes 1" in diameter—so as to provide substantial lateral play at the joint. Gaps 27 are left between the forked arms 24 and the extremity 22 of the fixed portion of the shank so as to allow also of substantial play at the joint in the lengthwise direction of the pivot pin. It is found that by providing in this way for considerable play at the pivot, the risk of the hinge being rendered inoperative or of being choked with sand or pebbles is avoided or at least minimized.

The weight distribution of the various parts is such that the centre of gravity of the unit comprising the fluke and the fixed portion 17 of the shank is well forward of a line between the hinge and the rear end of either blade. This arrangement ensures the initial digging-in of the point of the fluke when drag is applied by the cable.

When the anchor is dropped on to the sea-bed it may fall in one or other of four different positions. Either it may lie on one side or the other, occupying a position such as shown in Figure 6 which is the usual position, or in exceptional circumstances, it might fall with its plane of symmetry vertical in the upright position, as shown in Figure 1, or in an inverted position with the point upwardly directed. In either of the latter cases, the anchor will fall over on to its side as soon as the cable begins to drag. It has been found by actual test that whatever be the original position of the anchor when it falls on the sea-bed, it will start digging-in and automatically right itself when dragged forward by the mooring cable.

The action of the anchor is as follows: When lying on its side, as shown in Figure 6, the hinged portion 18 of the shank extends flat along the ground and the fluke is in contact with the ground at three points, namely, the hinge, the point of the fluke and the rear end of one of the blades. In this position the forward part of the fluke is set like a wedge aiming obliquely into the sea-bed. When the anchor, lying in this position, is

dragged forward by the mooring cable, the point of the fluke naturally digs into the ground. The disposition of the centre of gravity of the fluke and fixed portion of the shank forward of a line joining the hinge and the rear end of the anchor, prevents the possibility of the anchor riding along the sea-bed with the point clear of the ground. When the fluke starts digging-in, the downward pressure of the ground on the portion of the fluke forward of the pivot axis turns the point of the blade still further downwards. As the fluke buries itself, the earth pressure on the blades produces a resultant moment about the pivot axis tending to bring the fluke to an upright position with its plane of symmetry in the line of action of the mooring chain and the hinged shank portion. The anchor will remain substantially in that position while the drag is continued, because any lateral deviation of the point, due to irregularities in the ground, will at once produce a resulting moment about the pivot axis tending to return the fluke into alignment with the hinged shank portion. The provision of the hinge between the two portions of the shank—which is an essential of the invention—ensures that in the first place, when the anchor falls on the ground or when drag is initially applied, the fluke will take up a position such that it will tend to dig into the ground. The hinge thereafter ensures the automatic righting action of the fluke and the maintenance of substantially stable conditions during the continuance of drag.

Various modifications may be made in the construction of the anchor as described in the foregoing example without departing from the scope of the invention. In the construction illustrated the hinge lies immediately above the fluke, but other positions may be selected provided the hinge is located in the plane of symmetry and is directed towards the pointed end. For example, the fixed portion of the shank may be extended in a forwardly direction and the hinge be formed at a position in advance of one immediately above the point of the fluke, the hinge axis being as before directed towards the point, but in this case in a backwardly direction. Again, although it is preferred to employ a shank in two portions, it is within the invention to employ a single-piece shank which at one end is directly articulated to the fluke for pivotal movement about an axis disposed in the plane of symmetry of the fluke and directed towards the point.

It is to be noted that if, in designing the anchor, the directions given herein as to the distribution of the weight and other factors are observed, no stock is necessary. The invention, however, does not exclude the provision of a stock (e. g. on the fixed portion of the shank) which may in certain circumstances assist the initial digging-in or subsequent righting action of the anchor.

I claim:—

1. An anchor comprising a fluke in the form of a pointed structure symmetrical about a central plane which is vertical in the operative position of the anchor, and a shank which is pivotally articulated to the fluke for swinging movement with respect thereto about an axis which lies in the plane of symmetry of the fluke and aslant the line of pull of the cable.

2. An anchor comprising a fluke in the general form of a double-bladed plough-share symmetrical about a central ridge formed by the junction of the two blades and sloping downwardly towards a point, and a shank formed by two rigid portions, whereof one is rigidly fixed to the fluke

and extends outwardly from the central ridge in the plane of symmetry, and the other adapted to extend forwardly of the fluke, is hinged to the rigid portion for relative swinging movement about an axis which lies in the aforesaid plane of symmetry and intersects the ridge in the region of the point.

3. An anchor comprising a fluke in the general form of a double-bladed plough-share symmetrical about a central ridge formed by the junction of the two blades and sloping downwardly towards a point, and a shank formed by two rigid portions, whereof one is rigidly fixed to the fluke and extends outwardly from the central ridge in the plane of symmetry, and the other adapted to extend forwardly of the fluke, is hinged to the rigid portion for relative swinging movement about an axis which lies in the aforesaid plane of symmetry and intersects the ridge in the region of the point, the hinge between the fixed and pivoted portions of the shank being disposed above the fluke and directed obliquely in a forward direction towards the point.

4. An anchor comprising a fluke in the general form of a double-bladed plough-share symmetrical about a central ridge formed by the junction of the two blades and sloping downwardly towards a point, and a shank formed by two rigid portions, whereof one is rigidly fixed to the fluke and extends outwardly from the central ridge in the plane of symmetry, and the other adapted to extend forwardly of the fluke, is hinged to the rigid portion for relative swinging movement about an axis which lies in the aforesaid plane of symmetry and intersects the ridge in the region of the point, the centre of gravity of the unit comprising the fluke and the fixed portion of the shank being disposed substantially forward of a line between the hinge and the rear end of either blade.

5. An anchor comprising a fluke in the general form of a double-bladed plough-share symmetrical about a central ridge formed by the junction of the two blades and sloping downwardly towards a point, the outer surface of each blade conforming to a section of a cylindrical surface formed by generators parallel to the central ridge, and a shank formed by two rigid portions, whereof one is rigidly fixed to the fluke and extends outwardly from the central ridge in the plane of symmetry, and the other adapted to extend forwardly of the fluke, is hinged to the rigid portion for relative swinging movement about an axis which lies in the aforesaid plane of symmetry and intersects the ridge in the region of the point.

6. An anchor comprising a fluke in the general form of a double-bladed plough-share symmetrical about a central ridge formed by the junction of the two blades and sloping downwardly towards a point, the two blades of the fluke being formed by sheet-metal plates bent to concave configuration and welded together along the ridge, and a shank formed by two rigid portions, whereof one is rigidly fixed to the fluke and extends outwardly from the central ridge in the plane of symmetry, and the other adapted to extend forwardly of the fluke, is hinged to the rigid portion for relative swinging movement about an axis which lies in the aforesaid plane of symmetry and intersects the ridge in the region of the point.

7. An anchor comprising a fluke in the general form of a double-bladed plough-share symmet-

rical about a central ridge formed by the junction of the two blades and sloping downwardly towards a point, the blades of the fluke being formed by sheet-metal plates bent to concave configuration and welded together along the ridge, and a shank formed by two rigid portions, whereof one is rigidly fixed to the fluke and at one end extends outwardly from the central ridge in the plane of symmetry and at the other end is carried through an aperture in the walls of the fluke and is shaped to lie in the angle between the blades and to extend towards the point, being welded in position and constituting a reinforcement for the blades, and the other portion is adapted to extend forwardly of the fluke and is hinged to the rigid portion for relative swinging movement about an axis which lies in the aforesaid plane of symmetry and intersects the ridge in the region of the point.

8. An anchor comprising a fluke in the general form of a double-bladed plough-share symmetrical about a central ridge formed by the junction of the two blades and sloping downwardly towards a point, and a shank formed by two rigid portions, whereof one is rigidly fixed to the fluke and extends outwardly from the central ridge in the plane of symmetry, and the other adapted to extend forwardly of the fluke, is hinged to the rigid portion for relative swinging movement about an axis which lies in the aforesaid plane of symmetry and intersects the ridge in the region of the point, the hinged connection between the two portions of the shank being arranged to provide considerable play, particularly in a direction along the length of the pivotal axis.

9. An anchor comprising a fluke formed by two sheet-metal plates welded together in the form of a double-bladed plough-share symmetrical about a central ridge formed by the junction of the two blades and sloping downwardly towards a point, a reinforcing cross bar extending thereto, and a shank formed by two rigid portions, whereof one is rigidly fixed to the fluke and extends outwardly from the central ridge in the plane of symmetry, and the other adapted to extend forwardly of the fluke, is hinged to the rigid portion for relative swinging movement about an axis which lies in the aforesaid plane of symmetry and intersects the ridge in the region of the point.

10. An anchor comprising a fluke in the form of a pointed wedge-shaped structure symmetrical about a central plane which is vertical in the operative position of the anchor, a member rigid with the fluke, and a shank which is pivotally articulated to the rigid member aforesaid for swinging movement with respect thereto about an axis which lies in the plane of symmetry of the fluke and aslant the line of pull of the cable.

11. An anchor comprising a fluke in the form of a pointed structure symmetrical about a central plane which is vertical in the operative position of the anchor and a shank formed by two rigid portions, whereof one is rigidly fixed to the fluke and extends outwardly therefrom in the plane of symmetry, and the other adapted to extend forwardly of the fluke, is hinged to the rigid portion for relative swinging movement about an axis which lies in the aforesaid plane of symmetry and is directed towards the point.

GEOFFREY INGRAM TAYLOR.