(No Model.)

P. PROTHEROE.

ANCHOR.

No. 310,614. Patented Jan. 13, 1885.

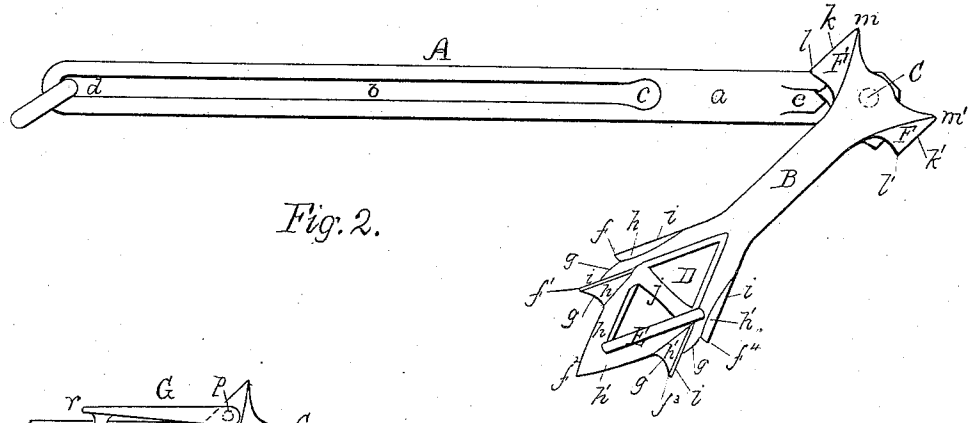


Fig. 2.

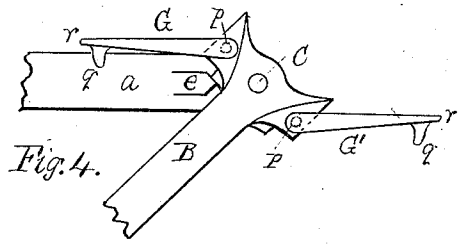


Fig. 4.

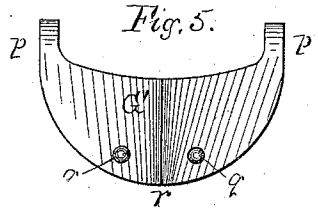


Fig. 5.

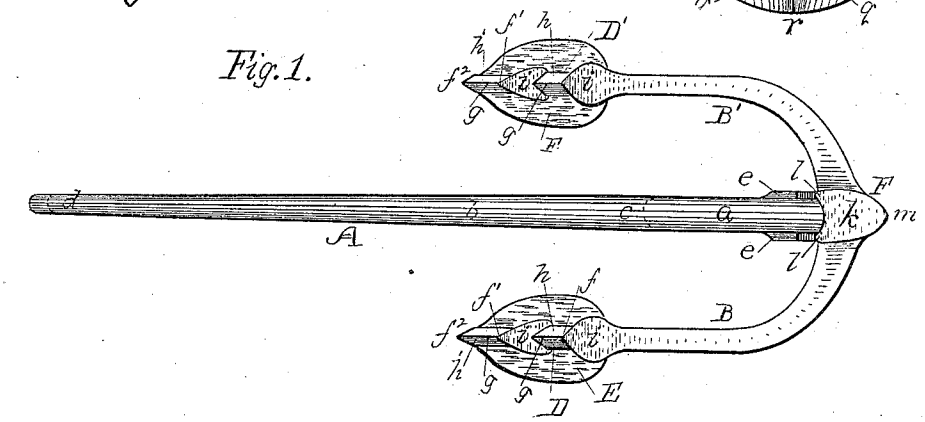


Fig. 1.

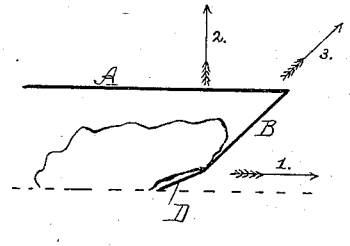


Fig. 3.

Witnesses.
H. L. Lodge
A. F. Hayden.

Inventor.
Pryse Protheroe.
A. Curtis atty.

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

PRYSE PROTHEROE, OF NORTH SYDNEY, NOVA SCOTIA, CANADA.

ANCHOR.

SPECIFICATION forming part of Letters Patent No. 310,614, dated January 13, 1885.

Application filed April 28, 1884. (No model.)

To all whom it may concern:

Be it known that I, PRYSE PROTHEROE, a subject of the Queen of Great Britain, residing at North Sydney, in the county of Cape Breton and Province of Nova Scotia, Dominion of Canada, have invented certain new and useful Improvements in Anchors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to that class of anchors in which the flukes swing pivotally upon the end of the shank, and are provided with stops to incline them at a fixed angle with reference to said shank when strain from the cable is brought to bear thereon; and it consists, primarily, in doing away with the stock which hitherto has been employed to cant or bring the flukes in a proper position relatively to the ground on which the anchor rests. In this device it is not required, as, owing to the general shape of the anchor, it will always assume a proper position, or is self-canting, and is ready for active service the moment any pull is exerted upon it; secondly, in slotting the shank, which slot receives a ring or shackle connected with the cable, and extends within a line drawn from the extremities of the two flukes, for the purpose of tripping in case the anchor becomes rocked, entangled in a cable, or otherwise fouled, and thereby enables the "buoy-rope," so called, which is used for a similar purpose, to be dispensed with; thirdly, in forming both sides of the flukes alike or reversible, and providing them with movable "palms," which so adjust themselves angularly when a pull is exerted with reference to the shank that the resultant of the pull will always tend to bury the anchor still deeper.

Other minor details of construction will hereinafter be more fully described.

The drawings accompanying this specification represent in Figure 1 a plan, and in Fig. 2 a side elevation, of an anchor embodying my invention in an inactive and active position, respectively. Fig. 3 is a diagram representing the condition of forces employed in tripping when fouled; and Fig. 4 represents the feathering levers as applied to the anchor, and Fig. 5 is a plan of the under side of the same.

In the anchor represented in the drawings I have shown the shank A as a straight slotted bar made of any suitable metal, whose extremity or head *a* is solid, and to which is pivoted at C the flukes B B'. In this a slot, *b*, is formed, extending about two-thirds of its entire length, and adapted to receive and hold the link or shackle, which plays therein and secures the anchor to the cable. The end of the slot *b* toward the flukes is slightly enlarged, as shown at *c*, and extends beyond a line drawn from the extremities of the said flukes, for purposes hereinafter described. When the anchor is actively employed, with the shank in a horizontal position, the flukes have dropped and assumed an angle with it of forty-five degrees, or thereabout. This angle is determined by the position of two ears or stops, *e e*, formed on each side of the head *a*, and against which the flukes bear, and are thus restricted to a position most effective for holding.

Ordinarily, the shackle which secures the cable to the anchor is secured permanently to the tail *d* of the shank. In my present device, when the anchor is fouled in some way by a rock or otherwise and it is necessary to disengage it therefrom, the cable is hove up short, and the vessel run up to or over the anchor, when the link, sliding the length of the slot *b* to *c*, engages in the enlargement before mentioned. The forces exerted in tripping are shown in Fig. 3, in which the heavy lines represent the anchor, while arrow 1 represents the force holding the anchor, and arrow 2 represents the cable-chain and the force exerted thereon. The resultant is shown at arrow 3.

To more fully describe the process of tripping in case of fouling, as the point of draft at *c* is nearer the pivot C than the extremities of the flukes, there is but little if any tendency to tip them, but only a pull is exerted, and the effect produced is as if the point of draft was from C; hence the flukes are easily and readily disengaged.

Hitherto the cable has generally been secured permanently to the tail of the shank, as

before premised, and any force exerted thereon tends to lift that portion of the shank, and only serve to make the flukes hold the more tightly. By the method I have adopted the anchor can be easily tripped without the use of the secondary agent—the buoy-rope, which has hitherto been employed to effect a similar object. The flukes B B′, to be made of wrought-iron, steel, or some tough strong metal, are curved bent arms with deep flat webs D D′, which, as the anchor is self-canting, always assume approximately a vertical position with respect to the ground to more readily sink and pass into it. It will be seen that the flukes are at an angle of about forty-five degrees with the shank when in an active position; but this angle is too obtuse to be efficient, and one much less—about twenty-five degrees—is very much more so. I have therefore formed the extremity of the flukes with a lozenge-shaped web, whose sides are so disposed as to retain and hold in proper position movable palms, to be hereinafter described, to assume proximately the latter angle, which is such as regards the forces applied to the anchor that the palms always tend to bury and fix themselves deeper in the bottom. These webs are lozenge or truss shaped, with spurs or points $f\ f'\ f^2\ f^3\ f^4$ projecting therefrom. The entering portions $g\ g$ thereof are knife-edged, running into double inclines or shares $h\ h\ h'\ h'$, and further provided with flat faces or palms $i\ i\ i'\ i'$. The center of the web may be open and formed with a brace or strut, j, which retains in position a wide heart-shaped swinging or pivoted palm, E, to effectually resist and oppose the movement of the anchor through the material upon which it may be cast, and to bring it to a holding position at once when a pull is exerted upon it, the whole acting as a share or plow to bury the anchor.

The upper faces or secondary palms, $i\ i$, in the present case are always parallel, and co-operate with the palm E when the latter has reached its extreme back position, and tend to offer an increased resisting-surface or holding-area to each fluke, while the under ones, $i'\ i'$, are practically inoperative and follow their points or shares $h'\ h'$, which catch on the ground, plow into and enter it, deeply burying the flukes B B′, with their palms. In case the anchor is canted in a reverse position, the faces $i'\ i'$ co-operate as secondary palms with the palm E, which is thrown to its other extreme, while the points $f\ f'$, which are now above, will be underneath, and act as plows to enter the ground.

To give greater strength to the flukes B B′ at that point where the head a of the shank is pivoted, I have provided two ribs, F F′, with flat faces $k\ k'$ and P's or points $l\ l\ l'\ l'$, the concave portion between said points serving as a bearing, in conjunction with the stops $e\ e$, and aid in maintaining the fixed angle between the flukes and the shank when the anchor is actively employed. The points themselves when the anchor is let go and has reached the bottom co-operate with the under points, $i\ i$ or $i'\ i'$, as the case may be, on the extremities of the flukes, to resist any tendency of the anchor to drag, and thereby quickly turn the flukes at an angle with the shank, when they at once enter the ground and bring the anchor to a holding position. The points $m\ m'$, as shown in Fig. 2, are to effect quick turning or reversal of the anchor in case of sheering of the vessel, which may cause the pull to be brought in an opposite direction, when any tripping of the anchor caused by said pull will bring the crown of the flukes on one or both of the points $m\ m'$ and effect its reversal, thereby preventing tendency to drag.

I propose adding to the anchor, as shown in Figs. 4 and 5, and at the crown thereof, swinging feathering levers G G′, which in their inactive positions lie along the shank A; but when the anchor is cast off one of them assumes an active position, as shown. When the flukes are at forty-five degrees with the shank, this lever has swung through an arc of one hundred and eighty degrees, and lies out behind and parallel with it. The general shape of the lever may be semicircular, with two legs, $p\ p$, straddling the shank, and pivoted on the arms of the flukes in any suitable manner. The under or inner sides are convex with double inclines, and are provided with horns or prongs $q\ q$. The action of this adjunct or lever to the anchor is as follows: Supposing the anchor to have been cast off and resting on the bottom, when the pull or strain is brought upon the shank, the front of the lever engages in the ground much more readily than the points $f f'$ f^2, &c., as the length of these levers is much shorter than that of the flukes from the pivot C. Hence in hard sandy or clay bottom the under lever is thrown away from the shank by the plowing action of the lever in opposing the cable strain or pull upon the anchor, while the horns $q\ q$ thereon assist the movement by entering the ground or catching in a crevice of rocks. Thus the crown of the anchor is slightly lifted, moving upon the outer edge, r, of the lever as a rest. This elevating of the crown aids the points in the webs D D′ to assume an angle with and enter the ground, while, as the palms bury themselves, the anchor advances and the lever swings out backward until in line with the axis of the shank, where it rests against a suitable stop. There is a further advantage to be derived from the use of this swinging lever, as when the anchor is to be hove up the lever G′, which lies in the position above premised, increases the length of the shank, while the point of leverage upon the flukes is increased by being transferred from the points $m\ m'$ on the crown to the point r on the lever, the latter being made of a strength suitable to resist the strain brought to bear upon it by the flukes when in the act of tripping.

There are many advantages obtained in an anchor constructed as above described, among

them the following: It is very compact and easily stowed away. The curve of the flukes at the crown is sharp, which brings them closely to the shank, giving maximum strength, while at the same time great holding-surface is presented by the pivotal or swinging palms, which may be varied in size or shape as may be desired. It is impossible to get it fouled by the vessel's cable in sheering, and thereby cause it to trip, while it is self-canting without the aid of a stock, owing to the length of the flukes as compared with that of the shank, and it is self-tripping in case of fouling with sunken material, rocks, or marine cables.

There are various modifications which slight mechanical skill might suggest, such as dispensing with the ribs F F', spanning the shank at the crown of the flukes, and forming the points *m m'* on either side of the shank on the flukes. Again, the upper part of the fluke, between the web D and the crown, may be an open truss-shaped arm with supporting struts or braces, thereby adding to the strength of the arm, while the palms E E, shown as secured in place by the struts *j j*, may be secured by pivots in lieu thereof. These slight modifications I do not consider depart, materially, from the spirit of my invention, which, I claim, consists, broadly, in an anchor provided with a slotted shank without a stock, and furnished with two pivotally-arranged flukes constructed with a truss-shape web containing swinging adjustable palms and points or spurs, to facilitate the ready entrance of the anchor into the ground, the palms always assuming a less angle with the surface of the bottom than the flukes to which they are attached.

The slot *b* may be omitted, and in lieu thereof a head may be formed on the tail of the shank, and the link of the cable allowed to play on the shank in lieu of in the slot. The depth of the web is the same as the width between the faces *k k'* at the pivot C, that the flukes may lie flat and even with the shank when the anchor is stowed away.

I claim—

1. An anchor-shank, A, having a longitudinal slot, *b*, terminating at its lower end in an enlargement, *c*, in combination with a suspending link or shackle which slides in said slot, and flukes which are pivoted to the head of said shank, substantially as set forth.

2. An anchor-shank, A, and flukes B B', pivoted thereto, in combination with movable palms attached to the end of said flukes, substantially as and for the purpose set forth.

3. The pivoted flukes B B', in combination with shank A, provided with a head, *a*, and longitudinal slot *b*, said slot extending toward said head beyond a line connecting the outer ends of the flukes when the latter are in a position to hold, substantially as shown.

4. In combination with the shank A or its equivalent, as herein described, the pivoted flukes B B', constructed with the webs D D', containing the movable palms E E and the fixed secondary palms, with their points, substantially as stated.

5. An anchor as herein described, constructed with the swinging feathering levers G G', provided with the double-inclined faces and prongs or horns *q q*, substantially as and for purposes herein set forth.

In testimony whereof I affix my signature in presence of two witnesses.

PRYSE PROTHEROE.

Witnesses:
H. E. LODGE,
A. F. HAYDEN.