VI. *An Account of a Method for the ſafe Removal of Ships that have been driven on Shore, and damaged in their Bottoms, to places (however diſtant) for repairing them. By Mr.* William Barnard, *Shipbuilder*, Grove Street, Deptford; *communicated by* Nevil Maſkelyne, *D. D. F. R. S. and Aſtronomer Royal.*

Read Dec. 23, 1779.

Deptford, April 14, 1779.

ON the ſhores of this Iſland, diſtinguiſhed for its formidable fleets and extenſive commerce, and ſo particularly ſituated, there muſt neceſſarily be many ſhipwrecks: every hint by which the diſtreſs of our fellow creatures may be alleviated, or any ſaving of property made to individuals in ſuch ſituations, ſhould be communicated for their good. As the members of the Royal Society have it in their power to make ſuch hints moſt univerſally known, I have been induced, from their readineſs to receive every uſeful information, to lay before them a particular account of the ſucceſs attending a method for the ſafe removal of ſhips that have been driven on ſhore,

ſhore, and damaged in their bottoms, to places (however diſtant) for repairing them; I hope, therefore, they will excuſe the liberty I have taken in preſenting this to them. Should the Society honour me by recording it, it will make me the moſt ample ſatisfaction for my attention to it, and afford me the greateſt pleaſure.

On January the 1ſt, 1779, in a moſt dreadful ſtorm, the York Eaſt Indiaman, of eight hundred tons, homeward bound, with a pepper cargo, parted her cables in Margate Roads, and was driven on ſhore, within one hundred feet of the head, and thirty feet of the ſide, of Margate Pier, then drawing twenty-two feet ſix inches water, the flow of a good ſpring tide being only fourteen feet at that place.

On the 3d of the ſame month I went down, as a ſhipbuilder, to aſſiſt as much as lay in my power my worthy friend Sir RICHARD HOTHAM, to whom the ſhip belonged. I found her perfectly upright, and her ſhere (or ſide appearance) the ſame as when firſt built, but ſunk to the twelve feet water mark fore and aft in a bed of chalk mixed with a ſtiff blue clay, exactly the ſhape of her body below that draft of water; and from the rudder being torn from her as ſhe ſtruck coming on ſhore, and the violent agitation of the ſea after her being there, her ſtern was ſo greatly injured as to admit free acceſs thereto, which

which filled her for four days equal to the flow of the tide. Having fully informed myſelf of her ſituation and the flow of ſpring tides, and being clearly of opinion ſhe might be again got off, I recommended, as the firſt neceſſary ſtep, the immediate diſcharge of the cargo; and, in the progreſs of that buſineſs, I found the tide always flowed to the ſame height on the ſhip; and when the cargo was half diſcharged, and I knew the remaining part ſhould not make her draw more than eighteen feet water, and while I was obſerving the water at twenty-two feet ſix inches by the ſhip's marks, ſhe inſtantly lifted to ſeventeen feet eight inches, the water and air being before excluded by her preſſure on the clay, and the atmoſphere acting upon her upper part equal to ſix hundred tons, which is the weight of water diſplaced at the difference of thoſe two draughts of water.

The moment the ſhip lifted, I diſcovered ſhe had received more damage than was at firſt apprehended, her leaks being ſuch as filled her from four to eighteen feet water in one hour and a half. As nothing effectual was to be expected from pumping, ſeveral ſcuttles or holes in the ſhip's ſide were made, and valves fixed thereto, to draw off the water to the loweſt ebb of the tide, to facilitate the diſcharge of the remaining part of the cargo; and, after many attempts, I ſucceeded in an external application

tion of ſheep ſkins ſewed on a ſail, and thruſt under the bottom, to ſtop the body of water from ruſhing ſo furiouſly into the ſhip. This buſineſs effected, moderate pumping enabled us to keep the ſhip to about ſix feet water at low water, and by a vigorous effort we could bring the ſhip ſo light as (when the cargo ſhould be all diſcharged) to be eaſily removed into deeper water. But as the external application might be diſturbed by ſo doing, or totally removed by the agitation of the ſhip, it was abſolutely neceſſary to provide ſome permanent ſecurity for the lives of thoſe who were to navigate her to the river Thames. I then recommended, as the cheapeſt, quickeſt, and moſt effectual plan, to lay a deck in the hold, as low as the water could be pumped to, framed ſo ſolidly and ſecurely, and caulked ſo tight as to ſwim the ſhip independant of her own leaky bottom. I herewith ſend you a drawing of the ſame, which will give the Society a clearer idea of the buſineſs than a long deſcription, which, however, it may be uſeful to add for the better enabling others to put this method in practice.

Beams of fir timber, twelve inches ſquare, were placed in the hold under every lower deck beam in the ſhip, as low as the water would permit; theſe were in two pieces, for the convenience of getting them down, and alſo for the better fixing them of an exact length, and well bolted

bolted together when in their places. Over theſe were laid long Dantzic deals of two inches and an half thick, well nailed and caulked. Againſt the ſhip's ſide, all fore and aft, was well nailed a piece of fir, twelve inches broad and ſix inches thick on the lower, and three inches on the upper edge, to prevent the deck from riſing at the ſide. Over the deck, at every beam, was laid a croſs piece of fir timber, ſix inches deep and twelve inches broad, reaching from the pillar of the hold to the ſhip's ſide, on which the ſhores were to be placed to reſiſt the preſſure of the water beneath. On each of theſe, and againſt the lower deck beam, at equal diſtance from the ſide and middle of the ſhip, was placed an upright ſhore, ſix inches by twelve inches, the lower end let two inches into the croſs piece. From the foot of this ſhore to the ſhip's ſide, under the end of every lower deck beam, was placed a diagonal ſhore, ſix inches by twelve, to eaſe the ſhip's deck of part of the ſtrain by throwing it on the ſide. An upright ſhore, of three inches by twelve, was placed from the end of every croſs piece to the lower deck beams at the ſide; and one of three inches by twelve on the midſhip end of every croſs piece to the lower deck beam, and nailed to the pillars in the hold. Two firm tight bulkheads or partitions were made as near the extremes of the ſhip as poſſible. The cieling

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or inſide plank of the ſhip was very ſecurely caulked up to the lower deck, and the whole formed a compleat ſhip with a flat bottom within ſide to ſwim the outſide leaky one; and that bottom being depreſſed ſix feet below the external water, reſiſted the ſhip's weight above it, equal to five hundred and eighty-one tons, and ſafely conveyed her to the dry dock at Deptford.

Since I wrote the above account, I have been deſired to uſe the ſame method on a Swediſh ſhip, ſtranded near Margate on the ſame day as the York Eaſt India-man, and ſwim her to London. As this ſhip is about two hundred and fifty tons, and the execution of the buſineſs ſomething different from what was practiſed with regard to the large ſhip, I hope it will not be thought improper to deſcribe it.

As this ſhip's bottom was ſo much injured, having loſt eight feet of her ſtern-poſt and all her keel, ſeveral floor-timbers being broke, and ſome of the planks off her bottom, (ſo as to leave a hole big enough for a man to come through) ſeveral lower deck beams being likewiſe broke, and all the pillars in the hold broken and waſhed away; I thought it neceſſary to connect, in ſome degree, the ſhattered bottom with the ſhip's decks, not only to ſupport the temporary deck by which ſhe was to ſwim up, but to

prevent the bottom being cruſhed by the weight of the ſhip when ſhe was put upon blocks in the dry dock: to effect which, after I had put acroſs twelve beams of fir, ſix inches by twelve, edgeways, one under every lower deck beam of the ſhip, and well faſtened them to the ſhip's ſide, I placed two upright pieces to each beam of ſix inches by twelve, ſecurely bolted to the ſides of the keelſon, and ſcored ſix inches under the ſhip's lower deck beams, and three inches about the beams of the temporary deck, and well faſtened to each: then the deck was laid with long two-inch Dantzic deals, and well nailed and caulked; the ſhip's inſide plank was well caulked up to the lower deck. A piece of fir, of twelve inches broad and two inches thick on the upper, and four inches on the lower edge, was well nailed to the ſhip's ſide all fore and aft, and well caulked on both edges to prevent the ſide of the deck from leaking, or being forced up by the preſſure of the water againſt the deck, a two-inch deal or croſs piece was laid over every beam from the ſhip's ſide to the uprights at the middle line; then, at equal diſtance from the ſide and middle line, pieces of ſix inches ſquare, as long as could be got down, were put all fore and aft on both ſides, ſcored two inches over every croſs piece, and well bolted through the croſs piece and deck, and into the fir beams. From this fore and aft piece or ribband to the ſhip's

ſhip's ſide, and from it to the uprights in the middle, were placed two rows of diagonal ſhores, ſix inches ſquare, the heels of which were ſecurely wedged againſt the fore and aft piece or ribband, which afforded ſufficient ſupport to the temporary deck without any other ſhores. Two bulkheads or partitions were built, as far as the fore-maſt forward, and mizen maſt aft, well planked, ſhored, and caulked, to reſiſt the water. As decks laid in this manner, and in ſo much hurry as the time of low water requires, will of conſequence leak in ſome degree, and as that leakage, waſhing from ſide to ſide, will cauſe the ſhip to lay along, I fixed a two-inch deal, twelve inches broad, edgeways, all fore and aft at the middle line, and well caulked it, to ſtop half the water on the weather or upper ſide, when the ſhip would incline either way, which not only made her ſtiffer under ſail, but facilitated the pumping out the water made by leaks in the deck.

This deck was ſixty-three feet long and twenty-three feet broad, and was laid at five feet five inches above the bottom of the keel, or four feet above the top of the floor timbers, and ſwam the ſhip at twelve feet five inches water, reſiſting two hundred and ſixteen tons, and containing under it one hundred and twenty-four tons of water, which preſſing againſt the under ſide of the temporary

deck acted as ballaſt, and brought her ſafely into the dry dock at Deptford, from the moſt dangerous ſituation poſſible, being partly within and partly without Margate Pier, where ſhe had been left by ſome Ramſgate men, who had undertaken to remove her from the place where ſhe was ſtranded to a ſafer one within Margate Harbour.

REFERENCES,

A. Beams of Fir 12 inches square set across in halves with 12 feet scarph and bolted to each other and to the Ships side one under every Lower deck Beam.

B. Ships Lower deck Beams.

C. Flat of the Deck laid with 2½ in. deals 36 f.t long.

D. A piece of Fir 12 in.s broad & 6 in.s thick well nailed against the Ships side all fore & aft over the Deals to prevent the side of the Deck from rising.

E. Pillars in hold about which every half Beam was scored and through which the middle bolt of the Beams was driven.

F. Cross pieces of Fir 12 in.s broad and 6 in.s thick placed over every Lower Beam from the pillar in the middle to the side, to prevent the nails drawing through the deals, & to place the Shores upon to support the Deck.

G. Shores 12 in.s by 6 in.s on every cross piece and let into them 2 in.s.

H. Diagonal shores from the foot of every upright shore G. to the Ships side, under every end of Lower deck Beams.

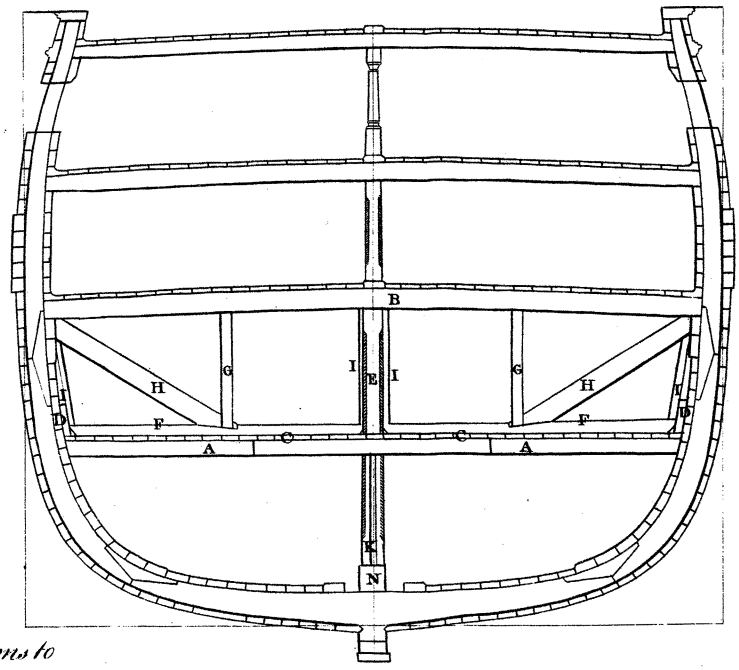
I. Shores of 12 in.s by 3 in.s from each end of the cross piece to the Lower deck Beams to keep the Cross piece from rising.

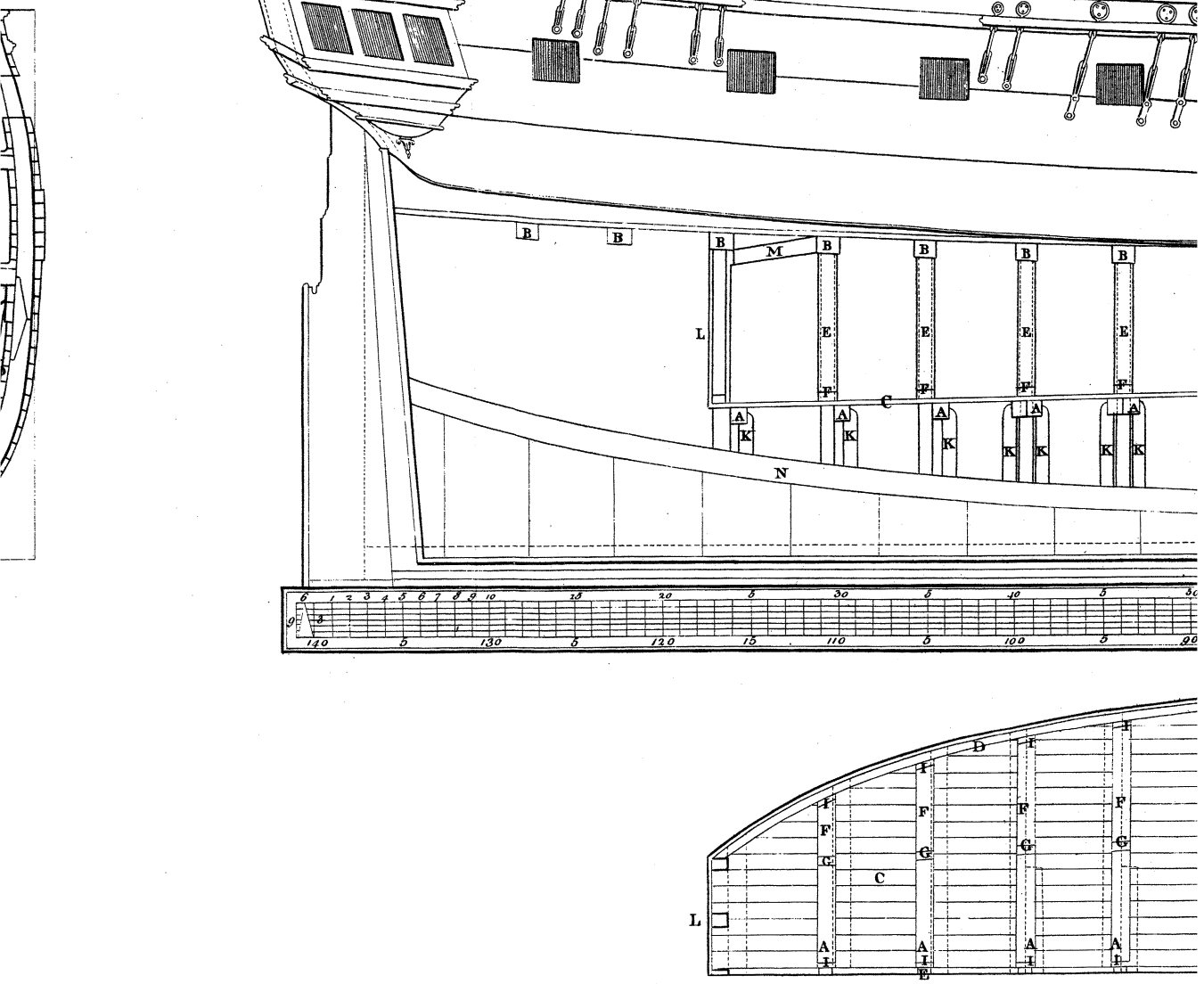
K. Shores of 10 in.s by 3 in. from the top of the Keelson under every half Beam, to prevent the Deck from settling, and thereby loosening the shores above.

L. Bulkheads to keep out the Water in the extreme ends of the Ship.

M. Shores to support Dº.

N. Ships Keelson.

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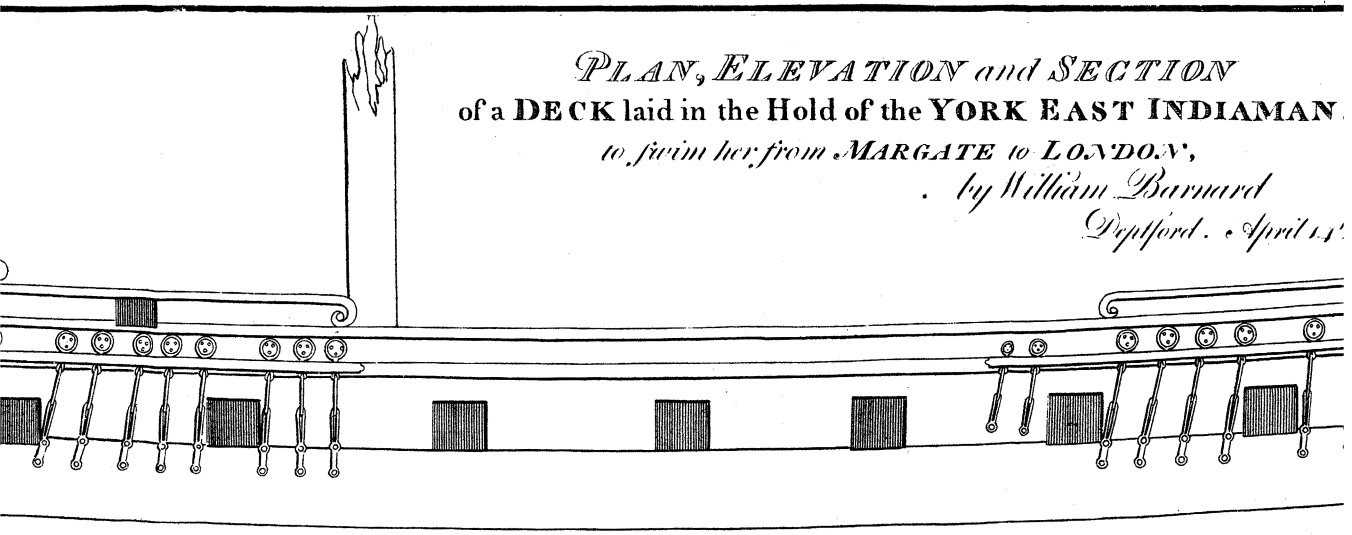
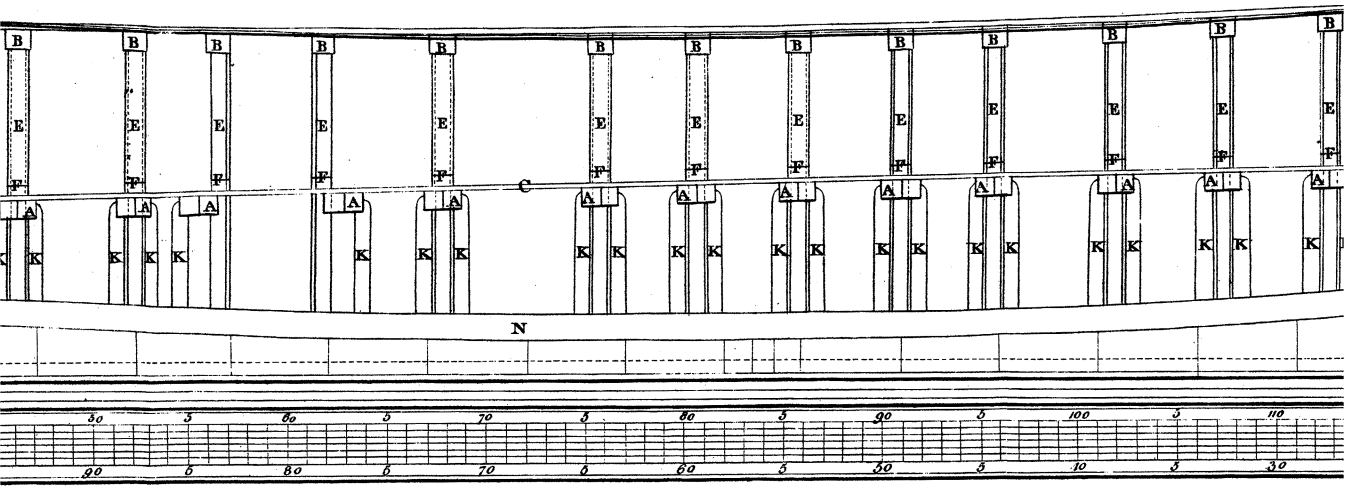
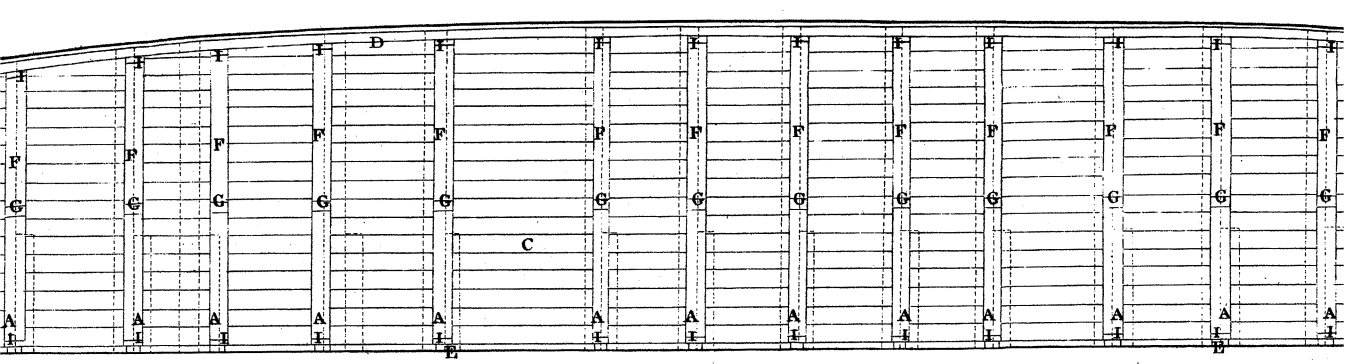
PLAN, ELEVATION and SECTION
of a DECK laid in the Hold of the YORK EAST INDIAMAN
to swim her from MARGATE to LONDON,

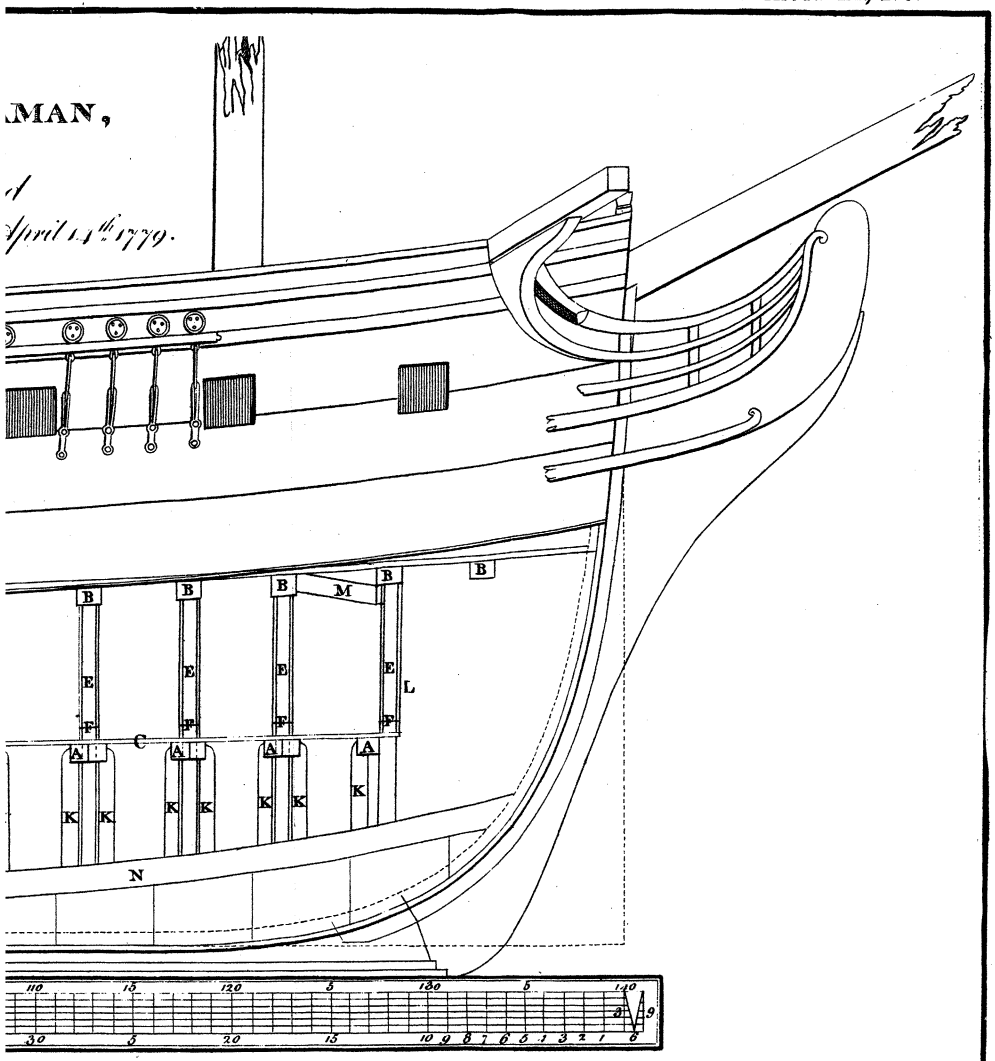
by William Barnard

Deptford. April 17





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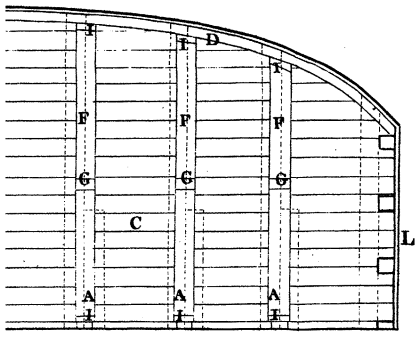
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Basire Sc.

REFERENCES.

A. Beams of Fir 6 in.^{2} by 12 in.^{2} under every Lower deck Beam in the Ship.

B. Upright pieces 6 in.^{2} by 6 in.^{2} two to every Beam, well bolted on each side the Kelson and to the Beams.

C. Flat of the Deck laid with long two inch Deals.

D. Pieces of Fir fore and aft on each side over the Deck, well nailed to the Ships side to prevent the Deck from rising.

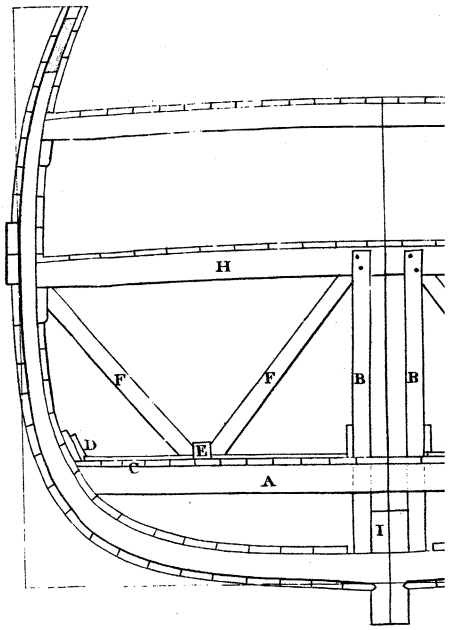
E. Pieces of Fir of 6 in.^{2} square bolted down to the Beams all Fore & aft, to support the heels of diagonal shores.

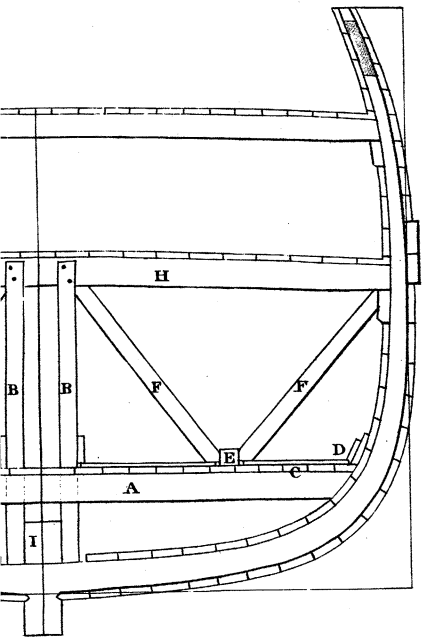
F. Diagonal shores of 6 in.^{2} square to support the Deck against the pressure of the Water beneath.

G. Bulkheads or Partitions to keep out the Water at the extremes of the Ship.

H. Ships lower deck Beams.

I. Ships Kelson.

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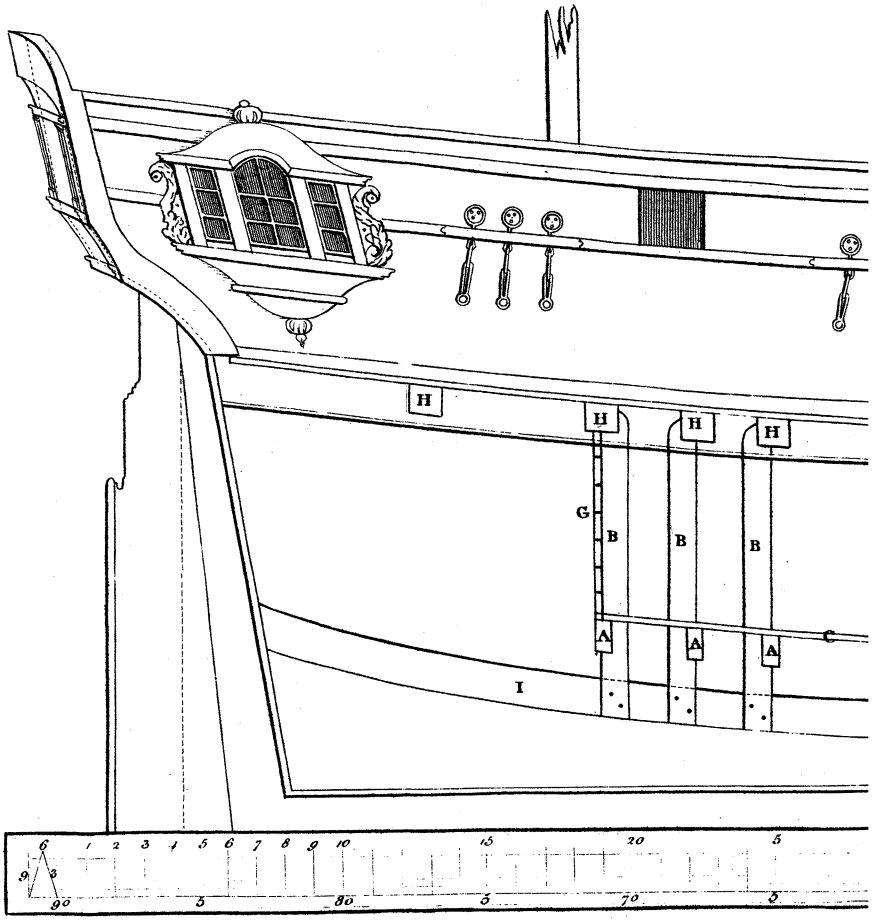
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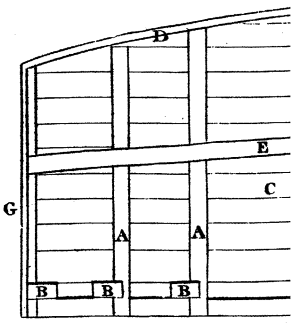
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PLAN ELEVATION and SECTION of a
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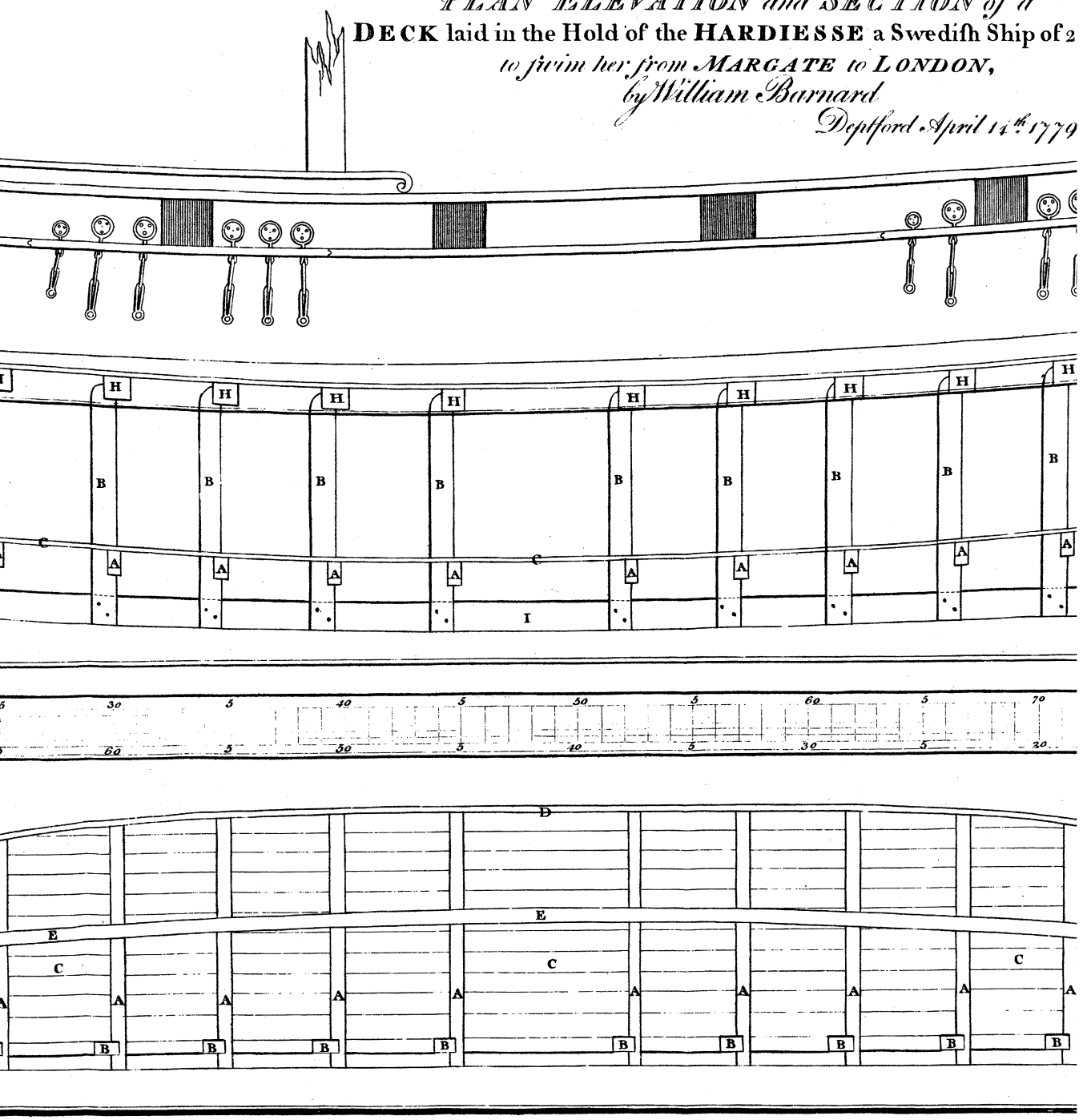
to swim her from MARGATE to LONDON,
by William Barnard
Deptford April 14th 1779



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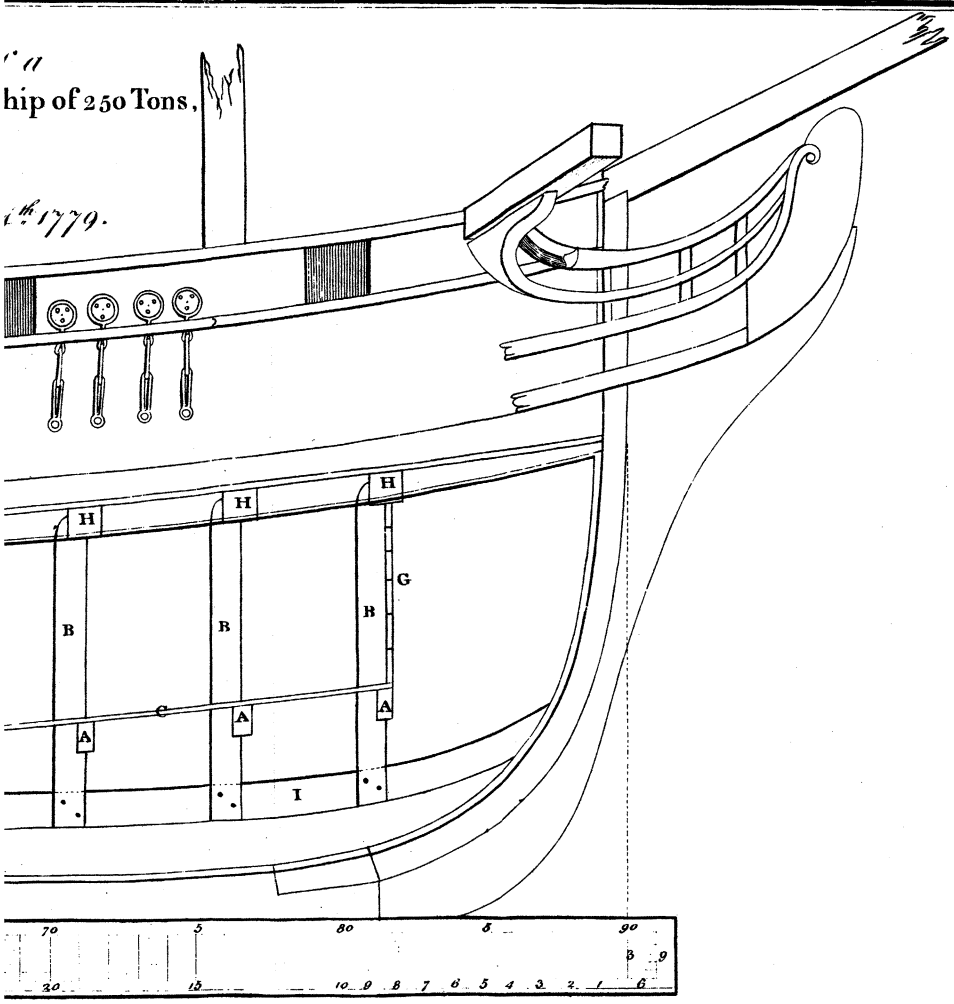
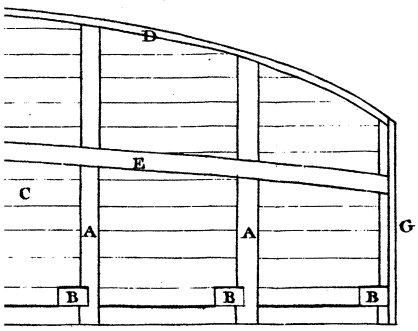




Basire Sc.

REFERENCES.

A. Beams of Fir 12 inches square but never in halves with 12 fat scarph and bolted to each other and to the Ships side one under every Lower deck Beam.

B. Ships Lower deck Beams.

C. Flat of the Deck laid with 2 in. deals 30 ft long.

D. A piece of Fir 12 in. broad & 6 in. thick well nailed against the Ships side all fore & aft over the Deals to prevent the side of the Deck from rising.

E. Pillars in hold about which every half Beam was scored and through which the middle bolt of the Beams was driven.

F. Cross pieces of Fir 12 in. broad and 6 in. thick placed over every Lower Beam from the pillar in the middle to the side, to prevent the nails drawing through the deals & to place the Shores upon to support the Deck.

G. Shores 12 in. by 6 in. on every cross piece and let into them 2 in.

H. Diagonal shores from the foot of every upright shore G. to the Ships side, under every end of Lower deck Beams.

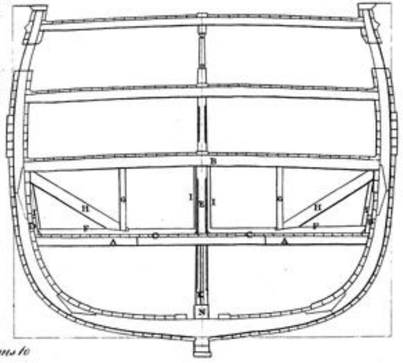
I. Shores of 12 in. by 3 in. from each end of the cross piece to the Lower deck Beams to keep the Cross piece from rising.

K. Shores of 10 in. by 3 in. from the top of the Keelson under every half Beam, to prevent the Deck from settling, and thereby loosening the shores above.

L. Bulkheads to keep out the Water in the extreme ends of the Ship.

M. Shores to support Dc.

N. Ships Keelson.



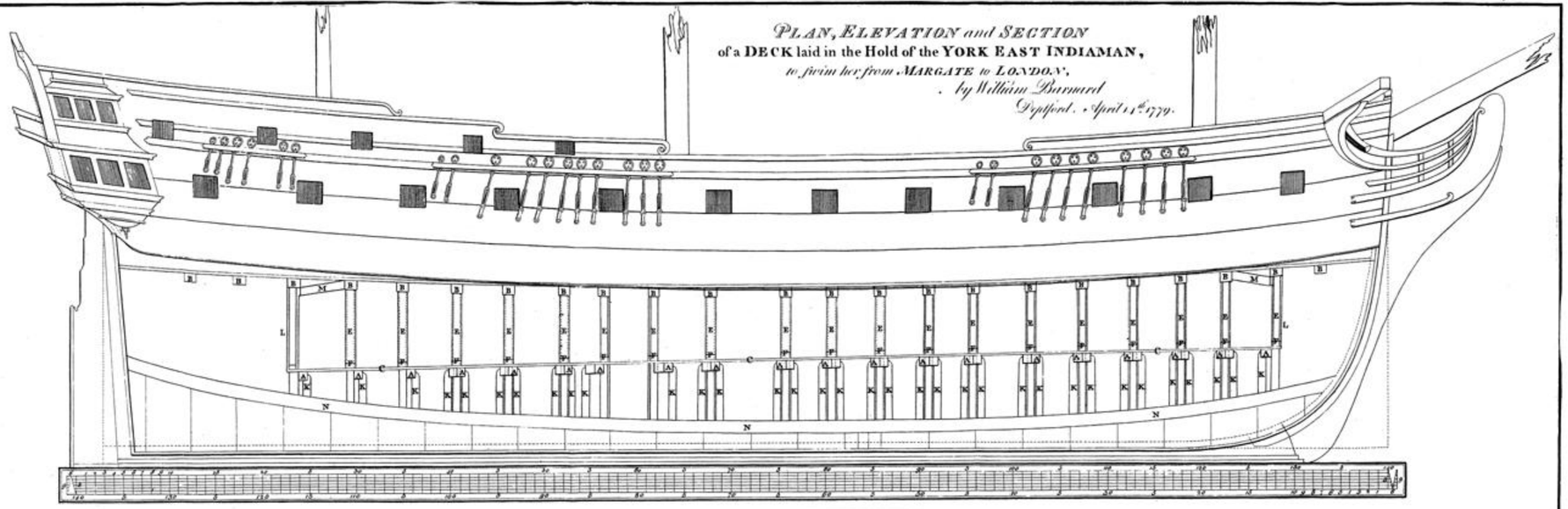
PLAN, ELEVATION and SECTION

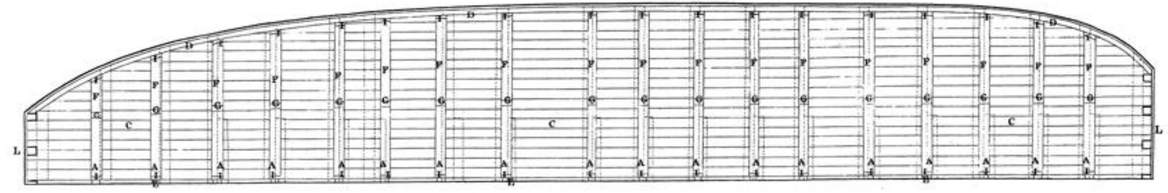
of a **DECK** laid in the Hold of the **YORK EAST INDIAMAN,**

to swim her from MARGATE *to* LONDON,

by William Barnard

Deptford. April 1st 1779.





Basire Sc.

PLAN ELEVATION and SECTION of a DECK laid in the Hold of the HARDIESSE a Swedish Ship of 250 Tons, to swim her from MARGATE to LONDON,

by William Barnard

Deptford April 14th 1779.

REFERENCES.

A. Beams of Fir 6 in. by 12 in. under every Lower deck Beam in the Ship.

B. Upright pieces 6 in. by 6 in. two to every Beam, well bolted on each side the Kelson and to the A Beams.

C. Flat of the Deck laid with long two inch Deals.

D. Pieces of Fir 5 in. and 1/2 on each side over the Deck, well nailed to the Ships side to prevent the Deck from rising.

E. Pieces of Fir 9 in. square bolted down to the Beams all Fore & aft. to support the heels of diagonal shores.

F. Diagonal shores of 6 in. square to support the Deck against the pressure of the Water beneath.

G. Bulkheads or Partitions to keep out the Water at the extremes of the Ship.

H. Ships lower deck Beams.

I. Ships Kelson.