


APPLICATION FILED NOV. 7, 1908.

Patented Oct. 25, 1910.

3 SHEETS--SHEET 1.



Inventor:  
Charles D. Dorland,  
by Bakewell, Byrnes & Parnelle,  
his attys.

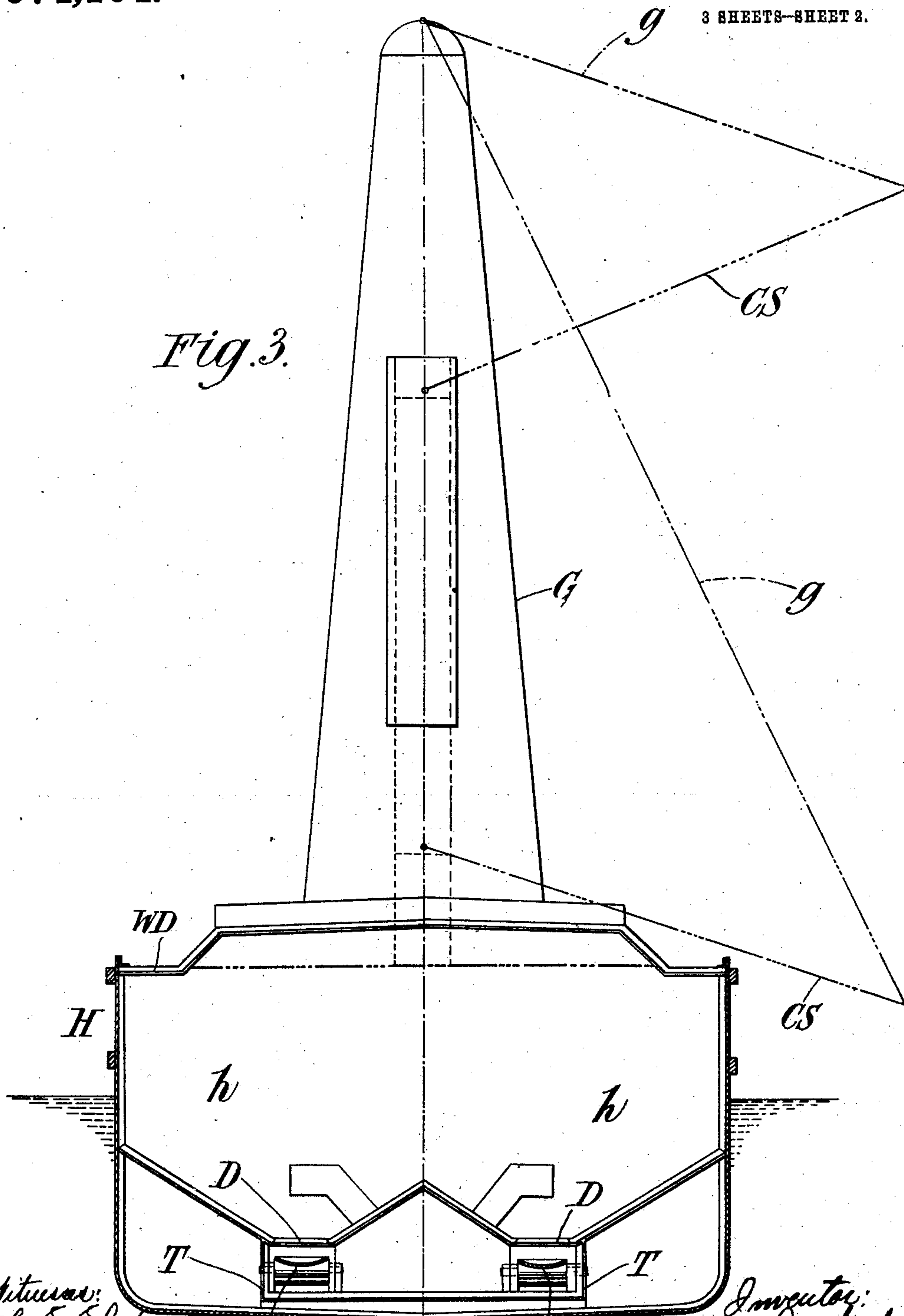
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DISCHARGING APPARATUS FOR NAVIGABLE VESSELS.  
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974,104.

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3 SHEETS—SHEET 2.

*Fig. 3.*



Witness:  
H. E. Shepard  
H. M. Baldwin

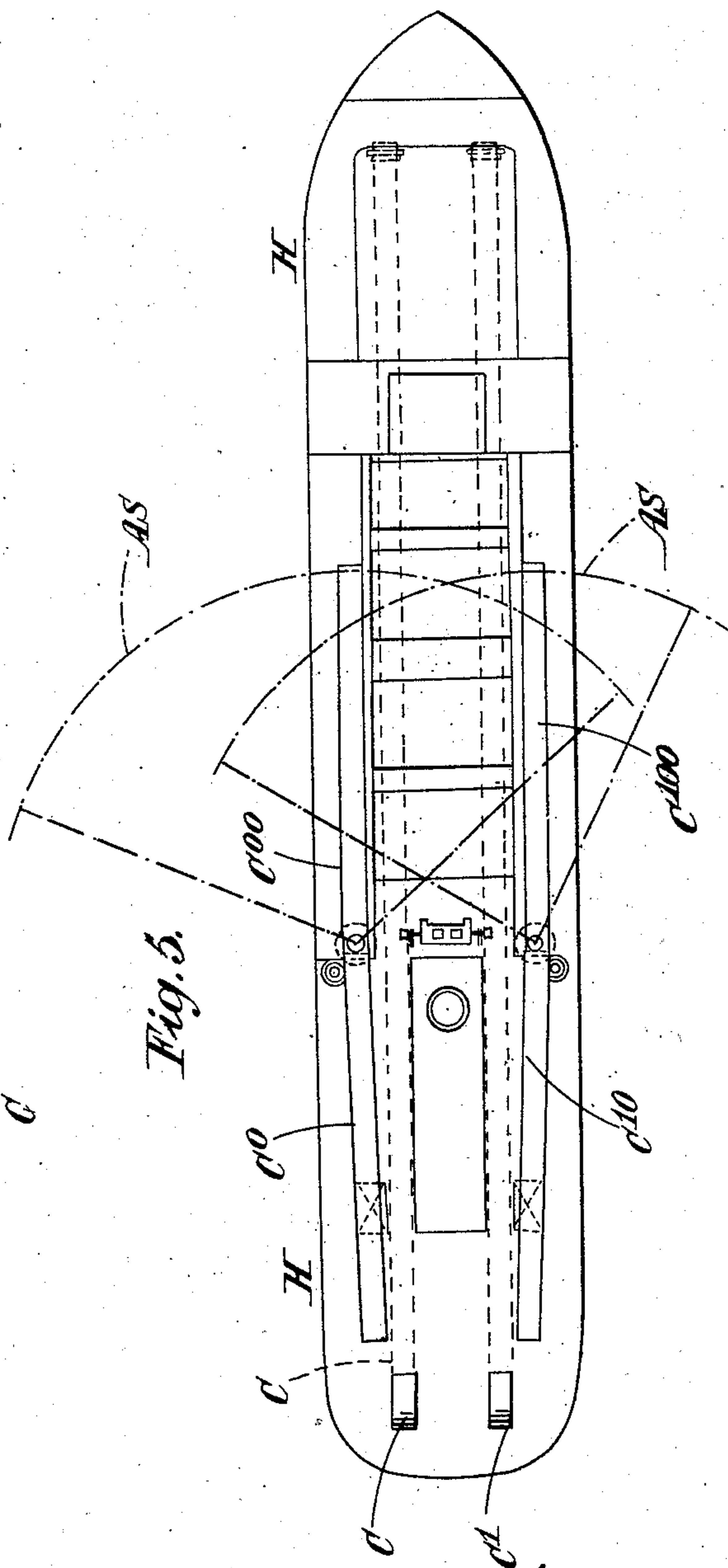
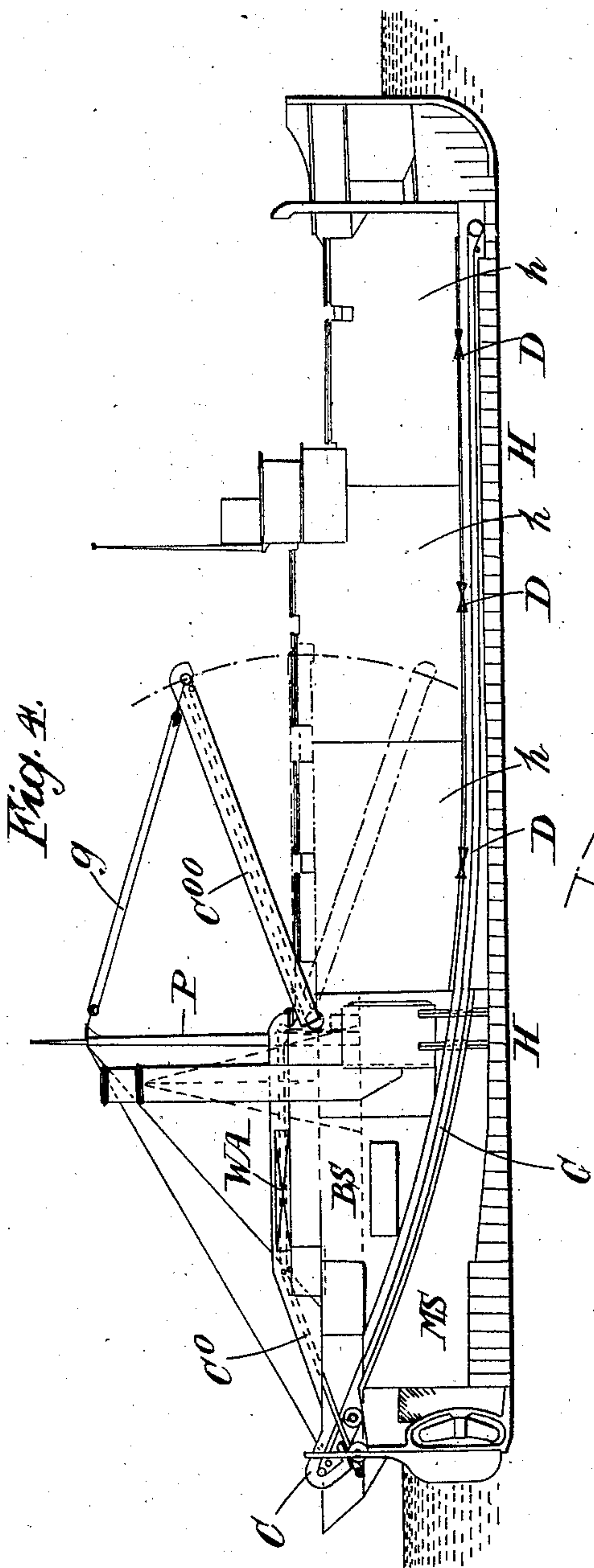
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# UNITED STATES PATENT OFFICE.

CHARLES D. DOXFORD, OF SUNDERLAND, ENGLAND.

DISCHARGING APPARATUS FOR NAVIGABLE VESSELS.

974,104.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed November 7, 1908. Serial No. 461,535.

*To all whom it may concern:*

Be it known that I, CHARLES DAVID DOXFORD, a subject of the King of England, residing at Sunderland, in the county of Durham, England, have invented certain new and useful Improvements in Discharging Apparatus for Navigable Vessels, of which the following is a specification.

This invention relates to discharging-apparatus for navigable vessels, its object being the construction, for a navigable vessel intended to carry coal or other bulk cargo, of a novel combination of devices to enable such cargo to be readily and rapidly discharged without the use of slides or chutes and, therefore, without breakage or damage. Such discharge can be effected at considerable heights above the discharging vessel, into, for instance, the bunkers of other vessels of different sizes, through hatchways or through side ports in them situated at different levels and positions laterally in regard to the longitudinal center line of the discharging vessel.

It has heretofore been proposed that a navigable vessel which has a cargo-conveyer or runway extending from the hold upward aslant should deliver cargo from that conveyer to a second conveyer terminated by chutes, down which chutes the material could gravitate from the second conveyer to the point of the final discharge. The employment of chutes is well understood to be very objectionable, for material tumbled down them is likely to break up or otherwise damage itself in its passage. Moreover, when chutes are used, it is necessary that cargo delivered by them should first be led to a higher level than that of the ultimate discharge, otherwise it would not gravitate thereto. This defect is not present if, instead of chutes, the ultimate discharging devices are conveyers or runways, *i. e.* devices along which cargo is propelled by propelling-apparatus provided for that purpose and not devices dependent upon gravitation for the passage of cargo therethrough.

The present invention comprises, for a navigable vessel which has a cargo-conveyer or runway extending from the hold upward aslant, through the machinery space or bunker, or through the fuel or boiler space, whether that space be aft or amidships, the provision of another or second conveyer or runway that is not only extended from the upwardly-slanted portion of the first-named

conveyer to any chosen position in the ship, but has as that one of its own extremities which is the remoter from the first conveyer a section or sections that are themselves the ultimate discharging devices and are conveyers or runways and not chutes and that possess one or both of the following characteristics: (a) adjustability to different levels of discharge, (b) lateral adjustability to different points of discharge.

The upwardly-extended portion of the first conveyer might be situated at the after end of the vessel or might be amidships; it preferably is at the after end and is there extended upward aslant through the machinery space, or bunker or fuel space, or boiler space; for example, it can be arranged according to the specification of prior application for United States Letters Patent, Serial No. 442916, filed 10th July 1908. The second conveyer can extend lengthwise of the vessel from the first conveyer and can be led to or toward the end of the ship. The adjustment to different levels of the section or sections aforesaid of the second conveyer may be effected by employing a conveyer or runway which is jointed so that a section of it can be raised or lowered by a gauntree mounted on the hull, and this portion may have for its outer extremity a terminal section or member mounted as a swivel boom so that it can not only partake of the rising and falling motion above alluded to, and can have a rising and falling motion of its own, but can also be swung to adjust laterally one end of it which projects outboard; further this terminal section or member can be topped when its heel is at a low level and so "housed" when not in active service.

It is within the present invention to provide a construction wherein the second conveyer extends only part of the way toward the end of the ship, and may or may not be hinged, but is provided with a terminal section or member mounted as a swivel-boom and guyed to a mast or derrick pole. The outer end of this terminal section can be swung laterally and also raised above or lowered below the level of its heel which conveniently is pivoted at about the deck level near one side of the ship. Thus cargo can be delivered from it alongside at points differing as much in level and in situation laterally of the longitudinal center line of the discharging vessel as would a point in a deeply laden lighter and another in a high



vessel or warehouse. Moreover, this terminal section can, if desired, be of such length that if swung over toward the side of the ship opposite to that at which its heel is situated, its outer end will discharge overboard at such opposite side.

The pair or group constituted by the first and second conveyers and their appurtenances may be duplicated and placed at opposite sides of the vessel; if not duplicated it is preferably situated on the longitudinal center line.

With the first and second conveyers combined in the manner above described, there may be combined also in a manner which is well understood and is not of the present invention, any suitable type of weighing apparatus that is automatic and is capable of weighing the contents of a chosen length of either of the conveyers or runways. This weighing apparatus is preferably of such type that its platform is virtually a continuation of the conveyor or runway to which it is applied.

The second conveyer may incline gradually upward throughout its length to the point at which the hinged section meets it and the weighing apparatus may be in this inclined portion; alternatively the second conveyer may be inclined upward to a convenient point and thence continued horizontally with the weighing apparatus in the horizontal portion.

The vessel wherein the second conveyer extends to the end of the ship would be well suited for use as a coaling vessel. The vessel in which the second conveyer delivers over-side could be a sea-going ship of any preferred type.

The conveyers employed might be belt-conveyers, although any convenient form of conveyor or runway could be adopted.

Two constructions of vessel fitted with the arrangement of conveyers according to the present invention are illustrated in the accompanying drawings, wherein:—

Figure 1 is a longitudinal section of one vessel; Fig. 2 is a deck plan thereof; Fig. 3 is a section on the line 3—3 of Fig. 1, looking from aft toward the bow; this last-named figure is drawn to a scale larger than that of Figs. 1 and 2; Fig. 4 is a longitudinal central section of the other vessel, and Fig. 5 is a deck plan corresponding with Fig. 4.

Like letters of reference indicate like parts throughout the drawings.

With reference first to Figs. 1, 2 and 3 H is the hull with a weather-deck WD.

A belt-conveyor C which is of a known type not in itself of the present invention, extends fore and aft in the ship on one side of the longitudinal center line and a similar conveyor C<sup>1</sup> is similarly disposed on the opposite side of that center line. The con-

veyer C is contained in a trunk T with doors D in it and extends from the holds *h* upward aslant through the boiler space BS and machinery space MS from a low level in the hold to a high level above that of the machinery space. C<sup>2</sup>, C<sup>3</sup>, C<sup>4</sup> is a second conveyor or runway extended lengthwise of the vessel from the upwardly-slanted portion of each of the two first-named conveyers C C<sup>1</sup> over the engine and boiler spaces and onward to the bow of the ship. The section C<sup>3</sup> of this second conveyor is jointed to the section C<sup>2</sup> at *c*.

G is a gauntree mounted on the hull H and provided with tackle *r t* for raising and lowering the forward end of the section C<sup>3</sup>. The terminal section or member C<sup>4</sup> is mounted like a swivel-boom upon the forward end of the section C<sup>3</sup> and partakes of the rising and falling motion of C<sup>3</sup>. A tackle *l t* is provided, by means of which the outermost end of the terminal section C<sup>4</sup> can be raised and lowered, and guys *g* are provided for this purpose and for swinging the section C<sup>4</sup> laterally.

In Fig. 1 the section C<sup>3</sup> C<sup>4</sup> is shown in full lines in one of its positions and in chain lines in various other positions to indicate the various levels at which its outermost end can be retained. One series of chain lines C<sup>40</sup> indicates the position of the terminal member when it is "housed". The chain lines M (Fig. 1) indicate diagrammatically the height of side of a very large vessel, and the chain lines F the freeboard and beam of, say, a fishing vessel on the same scale as that of the larger vessel. In Fig. 2 the chain lines C *p* and C *s* indicate the extreme positions to which the terminal section C<sup>4</sup> of the second conveyer can be swung, and the full lines indicate it in the middle position, all when it projects beyond the bow. In Fig. 3 the lines C *s* indicate the terminal section at two of its extreme levels and swung over to one side of the ship.

From the foregoing it will be seen that in the example chosen for illustration by Figs. 1, 2 and 3, a single central conveyor coöperates with each of the second or wing conveyers. The means for delivering material from the upwardly-slanted end of the conveyor C<sup>2</sup> to the adjacent or receiving ends of the second conveyers C and C<sup>1</sup> are not indicated in the drawings, which are intended to be purely diagrammatic. The driving mechanism and other omitted details of the conveyers are not of the present invention and may be such as are usual in ordinary conveyers, or such as may be found suitable to the particular circumstances in which they are used.

The chain lines C<sup>20</sup>, C<sup>200</sup> in Fig. 1 indicate an alternative arrangement of the second conveyor wherein it inclines gradually upward as to the part C<sup>20</sup> and thence is con-



tinued horizontally as to the part C<sup>200</sup>. The lines WA indicate weighing apparatus of any convenient automatic kind with its platform virtually a continuation of the conveyer or runway to which it is applied.

With reference now to Figs. 4 and 5, in this modification there are duplicate second conveyers. One of them C<sup>0</sup> C<sup>00</sup> is allotted to the conveyer C, and the other C<sup>10</sup> C<sup>100</sup> is allotted to the conveyer C<sup>1</sup>. The conveyer C<sup>0</sup> C<sup>00</sup> on one side of the ship is a duplicate of that on the other, so that only one of them need be here described. This conveyer C<sup>0</sup> C<sup>00</sup> has a weighing apparatus WA in it as indicated, and it extends as to the part C<sup>0</sup> over the engine and boiler spaces only part of the way toward the forward end of the ship, to a point a little forward of the funnel, where it is provided with the terminal member C<sup>00</sup> mounted like a swivel-boom and guyed by guys *g* to a derrick-pole P. This terminal member is indicated in full lines in one position and in chain lines in a second and lower position.

In Fig. 5, AS indicate the arcs of swing of the terminal portions of the two conveyers from which it will be seen that either of them could at any time deliver to either side of the ship.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A vessel having an engine room or machinery compartment, a traveling conveyer leading upwardly from the hold through said compartment, the conveyer passing through the machinery compartment on the slant, a second fore and aft traveling conveyer leading from the discharge end of the first mentioned conveyer, an adjustable receiving and discharge device at the extremity of the second conveyer, and a third traveling conveyer leading from the discharge end of the second conveyer and adjustable to bring its discharge end to different levels and to different lateral positions; substantially as described.

2. In a navigable vessel, the combination of walls bounding a space containing the

propelling or other controlling mechanism for the vessel, a moving conveyer extending from the hold upward aslant through said space, a second traveling conveyer extending from the first conveyer and having its discharge end remote from the first conveyer, a receiving device at the discharge end of the second conveyer, a third traveling conveyer leading from the receiving device at the discharge end of the second conveyer, the receiving device having an opening for discharging the material to the third conveyer, means for adjusting the height of the discharge end of the second conveyer and the receiving end of the third conveyer, and means for adjusting the height of the discharging end of the third conveyer; substantially as described.

3. In a navigable vessel, the combination of walls bounding a space containing the propelling or other controlling mechanism for the vessel, a moving conveyer extending from the hold upward aslant through said space, a second traveling conveyer extending from the first conveyer and having its discharge end remote from the first conveyer, a receiving device at the discharge end of the second conveyer, a third traveling conveyer leading from the receiving device at the discharge end of the second conveyer, the receiving device having an opening for discharging the material to the third conveyer, means for adjusting the height of the discharge end of the second conveyer and the receiving end of the third conveyer, means for adjusting the height of the discharging end of the third conveyer, and means for adjusting the discharge end of the third conveyer laterally with relation to the receiving end; substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHAS. D. DOXFORD.

Witnesses:

S. T. RODGER,  
W. A. PATERSON.