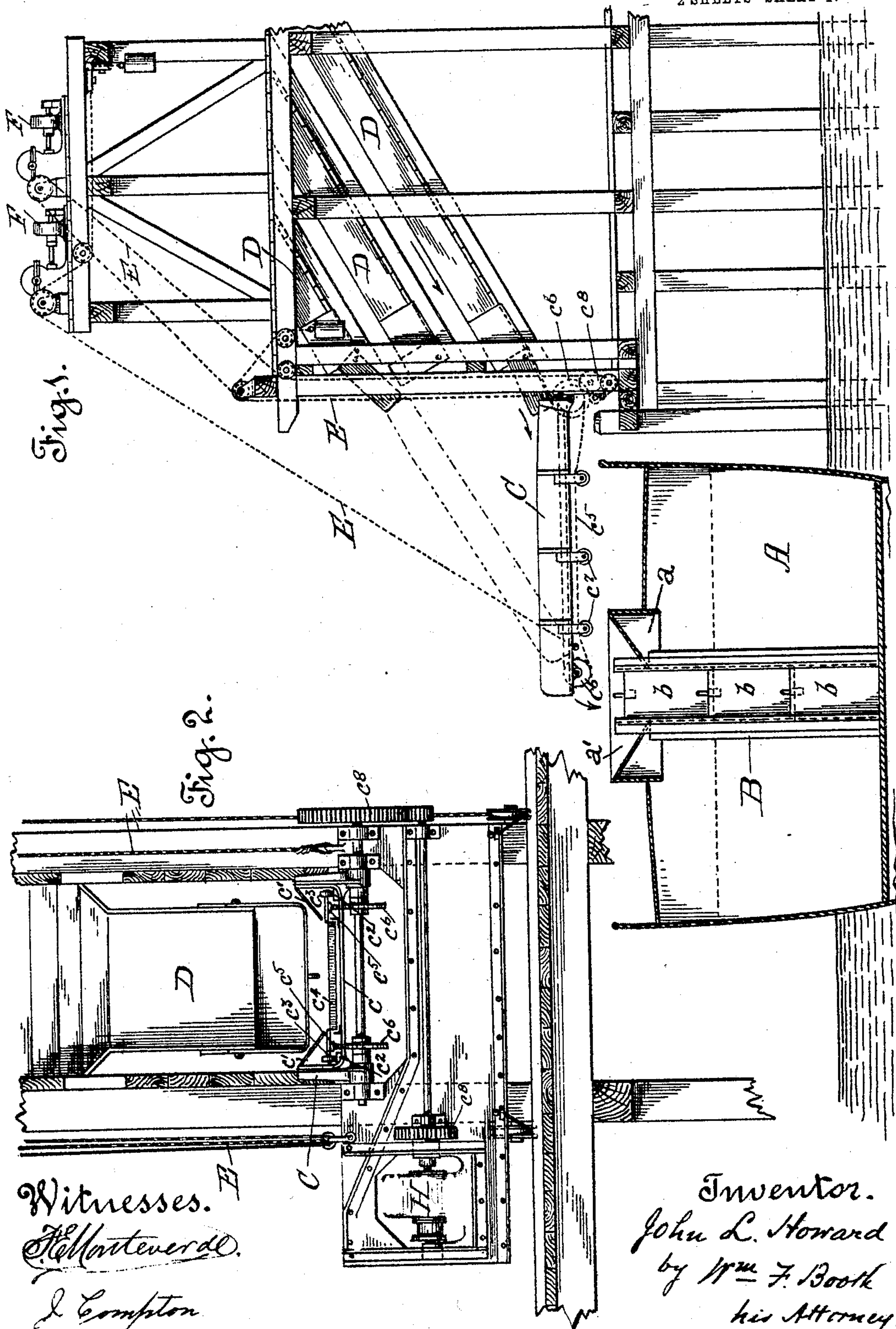


No. 795,770.

PATENTED JULY 25, 1905.

J. L. HOWARD.  
COAL LOADING APPARATUS.  
APPLICATION FILED DEC. 27, 1904.

2 SHEETS—SHEET 1.



Witnesses.  
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L. Compton.

Inventor.  
John L. Howard  
by Wm. F. Booth  
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2 SHEETS—SHEET 2.

Fig. 3.

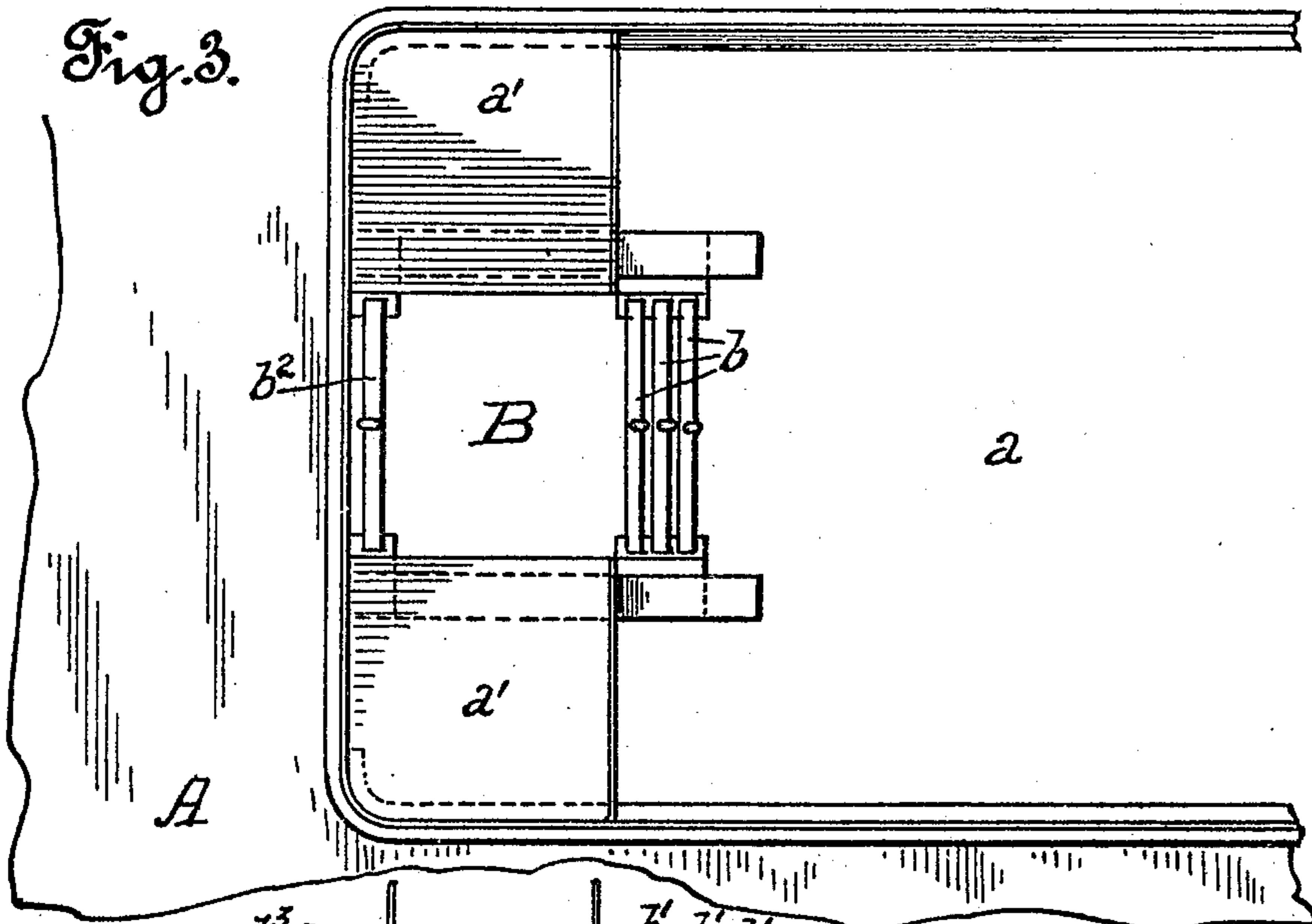
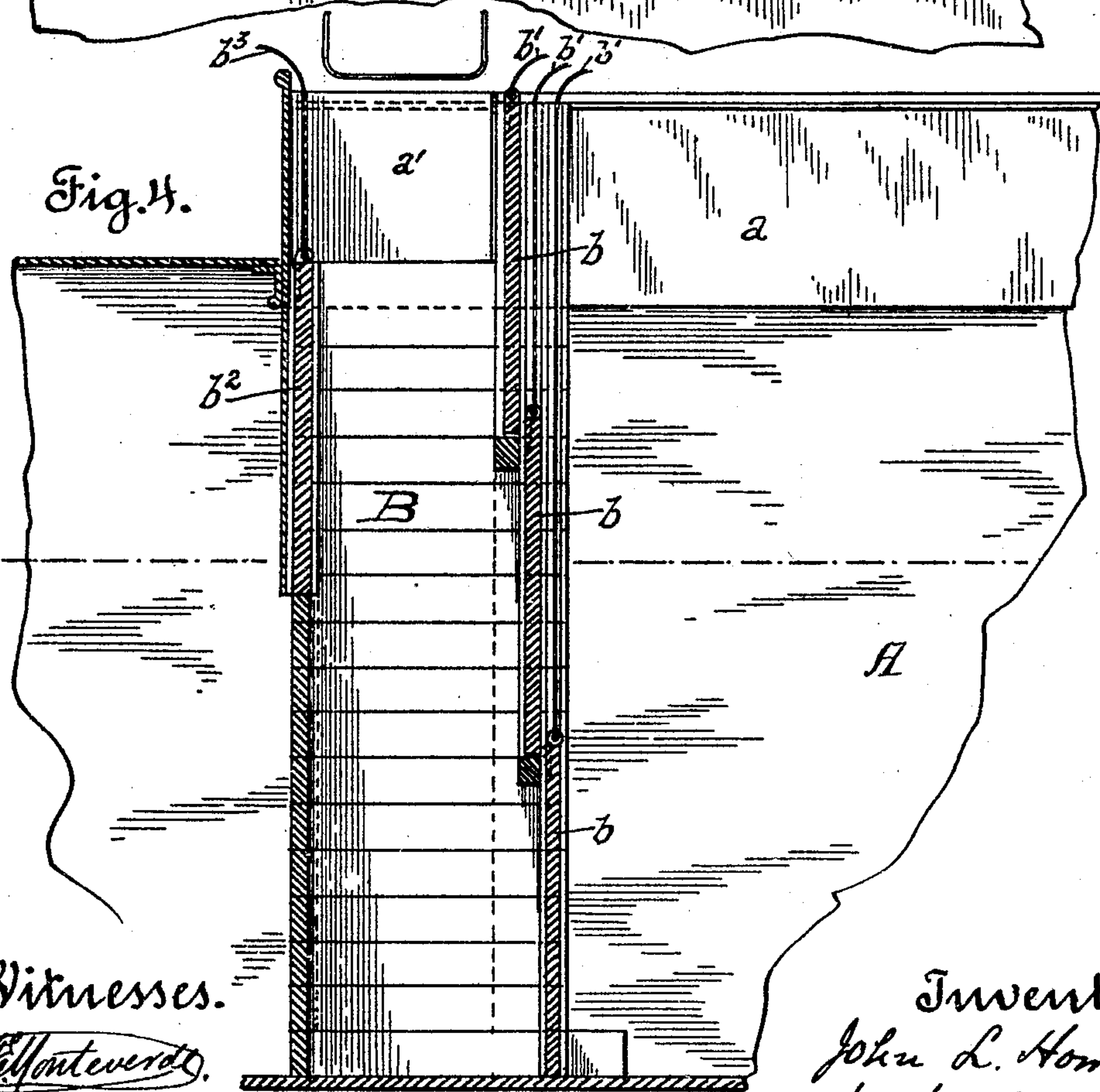


Fig. 4.



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# UNITED STATES PATENT OFFICE.

JOHN L. HOWARD, OF OAKLAND, CALIFORNIA.

## COAL-LOADING APPARATUS.

No. 795,770.

Specification of Letters Patent.

Patented July 25, 1905.

Application filed December 27, 1904. Serial No. 238,433.

*To all whom it may concern:*

Be it known that I, JOHN L. HOWARD, a citizen of the United States, residing at Oakland, Alameda county, State of California, have invented certain new and useful Improvements in Coal-Loading Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the general class of coal-loading apparatus, and has for its object the provision of suitable means for preventing the breakage of coal. This is especially important in loading ships with coal from the hoppers, in which the usual practice is to direct the coal by gravity from the hoppers through a chute to the hatches, through which it falls unguided and unrestrained into the hold. This results in serious breakage of the coal, by which the proportion of screenings is largely increased, with consequent financial loss. To remedy this is the object of my invention; and to this end my invention consists, first, in a novel controllable supply-trunk in the vessel's hold, to the mouth of which trunk at the hatch the coal is directed.

It also consists, in connection with said controllable supply-trunk, of an adjustable traveling conveyer disposed between the hopper-chutes and the mouth of said trunk to carry the coal from the hoppers and to deliver it to the supply-trunk.

Referring to the accompanying drawings, Figure 1 is an elevation of my apparatus, showing a vessel in cross-section with the supply-trunk applied to her hatch and hold. Fig. 2 is an end view enlarged of the adjustable traveling conveyer. Fig. 3 is a top view enlarged of the supply-trunk, showing its disposition in the hatch of the vessel. Fig. 4 is a vertical section of said trunk with all its controlling discharge-gates closed.

In Fig. 1, A indicates a vessel, in which *a* is the hatch. B is the supply-trunk, consisting of a vertically-disposed box constructed suitably and extending from the vessel's bottom upwardly through the hold and having its open upper end or mouth in the hatch *a* at one end thereof, as shown in Fig. 3. A directing-hopper is fitted in the hatch and inclines to the mouth of the trunk, as seen in Figs. 1 and 3. The front of the supply-trunk B has one or more discharge-gates *b*. A vertical series of three gates is deemed preferable for the sake of easier manipulation. These gates are shown in Figs. 1 and 4. Each gate is mounted, as shown in Fig. 3, in suitable

guides, and each is provided with a lifting-line *b'*, by which it can be raised independently of the others. The back of the supply-trunk, as shown in Fig. 4, is fitted with a single gate *b''*, which occupies a position at the upper portion of the trunk in the space between decks, or rather that space which would be between decks in an ordinary ship; but as in colliers there is no lower deck, as there is no necessity for it, I have simply indicated by a dotted line in Figs. 1 and 4 the plane of the lower-deck timbers, it being understood that the hold is open and clear except for said timbers from the main deck to the bottom. A lifting-line *b'''* is secured to the gate *b''* to raise and lower it.

For the sake of clearness it is advisable at this point to describe the function and mode of operation of the supply-trunk B. As stated hereinbefore, the practice in loading colliers is to deliver the coal by gravity through a chute from the hoppers to the hatch. The delivery-chute is an adjustable one to adapt it to communicate with any one of a tier of hoppers and to adapt its position to the height of the tide and to the varying heights of vessels; but notwithstanding this adjustability, conditions or a combination of conditions arise which result in the chute at times necessarily being disposed at so great an inclination that the velocity of the coal is relatively great, resulting in a most wasteful breakage. Even under the most favorable conditions, wherein the inclination of the chute is the least, there must still be a sufficient grade to enable the coal to run down, else the chute will choke, and when it is remembered that whether the speed of the coal be relatively great or small it is delivered in a sheer drop or fall from the lower end of the chute into the hold it will be understood that under any circumstances there is great breakage, and under less favorable conditions of height of hopper, lowness of tide, and depth of hold the breakage increases to a most wasteful degree and is not arrested for a long time, for the angle of repose of the coal-pile is not reached until the base of the cone of coal has become sufficiently broad to sustain an apex nearly at the height of the hatch, which height it is necessary to reach before the fall or drop is reduced enough to materially lessen the breakage. In contrast to these conditions and results it will now be understood that by delivering the coal to the supply-trunk B with all its discharge-gates closed the only breakage is that which occurs in the small amount necessary to fill the trunk,



and this breakage is only that due to an average fall of half the height of the trunk. When the trunk is full of coal, the lowermost gate *b* is hoisted, and while the coal is continuously delivered to the mouth of the trunk, falling only the short distance from whatever conveyor or chute is used to deliver it down to the constantly-maintained level of the column of coal in the full trunk, the coal flows out steadily and without appreciable breakage from the lower part of the column through the lowermost gate *b* into the hold. The trunk is thus kept full, and when the coal ceases to flow from the lowermost gate by reason of reaching its angle of repose the second gate is hoisted and the operation continued, and in like manner as the coal rises in the hold the third gate is lifted. As these three gates are on the front side of the trunk, the cone of coal increasing in height from each gate will extend backward on each side of the trunk and reach the hold back of the trunk; but as its apex is in front of the trunk that portion back of the trunk will be lower and will need trimming. This is the purpose of the single gate *b*<sup>2</sup> in the upper part of the back of the trunk. It is found in practice that the coal will trim itself on the back from the front gates about up to the level of the lower-deck timbers. Now by lifting the gate *b*<sup>2</sup> the coal will pass through it to the back, and thus trim the pile with but little hand-shoveling required.

I have thus far described the function of the supply-trunk without regard to the means for delivering the coal to it, for said trunk serves its purpose of preventing the drop or fall irrespective of the manner it receives the coal; but in order to attain the full purpose in view the velocity of the coal in reaching the trunk must be controlled under all conditions of height of hopper-chute, of tide, and of vessel. This is done by dispensing with a gravity-delivery and substituting delivery by a traveling conveyer adapted to receive and advance the coal and to control its speed by its own controllable motion. This conveyer I show in Figs. 1 and 2. It consists of a chute-like frame C, which is suspended in front of the vertical tier of hopper-chutes D by means of cables, (designated generally by E,) operated through suitable drums by a motor F. The frame C is properly counterbalanced, as shown in Fig. 1, and the attachment and course of the cables are such that the frame is adjustable at either or both ends and may be set to any inclination desired, all in a manner so obvious that as such attachments in detail form no part of my invention I have not deemed it necessary to more particularly de-

scribe them, especially as such attachments and adjustments are common in connection with the gravity-chutes employed in this art. The frame C has a trough-like bottom *c* (shown in Fig. 2) with inwardly-inclined side guards *c'*, which inclose chambers in which are tracks *c*<sup>2</sup>, on which travel the rollers *c*<sup>3</sup> at the ends of the cross-flights *c*<sup>4</sup>, which are secured to the endless side chains *c*<sup>5</sup>, passing over terminal sprockets *c*<sup>6</sup>, and guided below by hanging pulleys *c*<sup>7</sup>. The chains are driven by the inner sprockets, as indicated in Fig. 1, operated by the gears *c*<sup>8</sup>, Figs. 1 and 2, which are driven by the motor H, as seen in Fig. 2. This as a whole constitutes a traveling conveyer of a well-known type in which the cross-flights scrape the material along the bottom and control its advance and delivery. In the present arrangement it is obvious that the conveyer can be adjusted to any of the hopper-chutes, and no matter what may be its inclination it will receive the coal, advance it downwardly, or even at an upward incline, if necessary, at a constant rate, and deliver it gently to the open mouth of the supply-trunk B, thereby completing all the conditions of loading with the minimum breakage.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a coal-loading apparatus, a supply-trunk fitted in the vessel's hold, with its open top reaching to the hatch, said trunk having on one side a vertical series of independently-controllable discharge-gates, controlling the delivery of the coal from the whole of said side, and a controllable discharge-gate in its opposite side disposed at its upper portion to control the delivery from said side as required.

2. A coal-loading apparatus comprising a supply-trunk fitted in the vessel's hold, with its open top reaching to the hatch, said trunk having a vertical series of independently-controllable discharge-gates in one side, controlling the whole of said side, and a controllable discharge-gate in its opposite side, controlling the upper portion of said side, and an adjustable traveling conveyer, to carry the coal from the hoppers to the supply-trunk, said conveyer having its delivery end in proximity to the open top of the trunk.

In witness whereof I have hereunto set my hand.

JOHN L. HOWARD.

Witnesses:

HENRY C. DROGER,  
JOHN W. BURNES.