

(No Model.)

H. B. GATES.
DERRICK.

No. 535,537.

Patented Mar. 12, 1895.

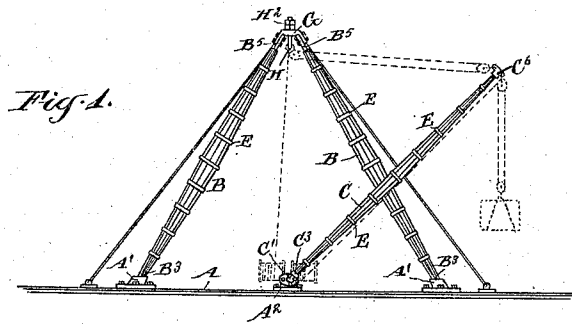


Fig. 2.

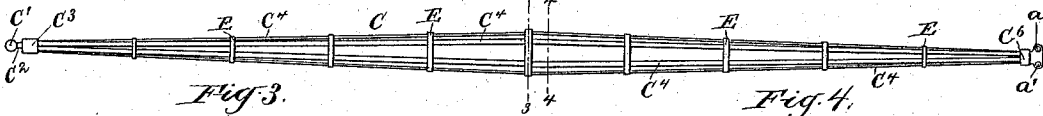


Fig. 3.

Fig. 4.

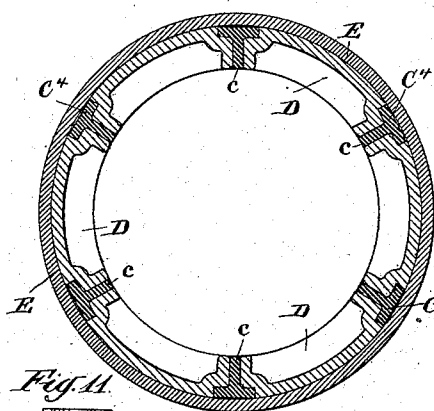


Fig. 5.

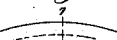


Fig. 6.

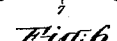


Fig. 7.

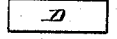


Fig. 8.

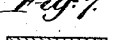


Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.

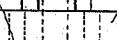


Fig. 14.



Fig. 15.



Fig. 16.



Fig. 17.



Fig. 18.



Fig. 19.



Fig. 20.



Fig. 21.



Witnesses:
Chas. E. Searle
W. A. Johnston.

Inventor:
Herman B. Gates,
by his attorney
Charles R. Searle

UNITED STATES PATENT OFFICE.

HERMON B. GATES, OF EDGEWATER, NEW JERSEY.

DERRICK.

SPECIFICATION forming part of Letters Patent No. 535,537, dated March 12, 1895.

Application filed December 14, 1894. Serial No. 531,747. (No model.)

To all whom it may concern:

Be it known that I, HERMON B. GATES, a citizen of the United States, residing at Edgewater, in the county of Bergen and State of New Jersey, have invented a certain new and useful Improvement in Derricks, of which the following is a specification.

The improvement relates particularly to the construction of the mast and boom. Each is an open framework, tapering in both directions from the mid-length. I use T-rails of rolled iron or steel extending lengthwise of the structure, joined to end-pieces properly shaped for the attachment of guys and pulleys at the upper ends, and for engagement with a swivel fastening and the anchorage on the deck or platform at the base.

The rails are arranged circumferentially, with the mid-flange projecting inwardly toward the center, and are braced apart at intervals by segmental spacing-blocks of cast iron of a radial thickness about equal to the depth of the rail, fitted between the rails, and properly formed at the ends to match closely to the sides thereof, leaving the center clear. Retaining rings, each of a diameter to match, are shrunk on at these points, binding the rails and inclosed spacing-blocks firmly together. The whole forms an eminently strong and light construction, particularly well adapted for use on floating docks, lighters and similar vessels, and also in other situations where combined strength and lightness are desirable.

The boom is mounted on a ball-and-socket joint, set at an angle to allow the boom to be raised and lowered within wide limits without strain upon the neck.

The ends of the rails are enlarged and secured in a properly formed block by a cup-shaped casting applied hot, and allowed to cool in place, forcibly locking the rail ends in the block and holding all fast. The cup-shaped casting at the lower end of the boom carries the ball engaging in the socket. At the upper end a similar casting is provided with holes for the engagement of the hoisting blocks.

The accompanying drawings form a part of this specification.

Figure 1 is an elevation. Fig. 2 is a side view of the boom attached, partly in longi-

tudinal section. Figs. 3 and 4 are cross-sections on a larger scale, on the lines 3—3 and 4—4 in Fig. 2. Figs. 5, 6 and 7 show one of the spacing-blocks. Fig. 5 is a face view. Fig. 6 is an end view, and Fig. 7 is a section on the line 7—7 in Fig. 5. The remaining figures show details. Fig. 8 is a vertical section, partly in elevation, showing the ball-and-socket step for the boom. Fig. 9 is a section on the line 9—9 in Fig. 8. Fig. 10 is an end view of a portion alone. Fig. 11 is a side view of the same. Fig. 12 is an elevation, showing the means for securing the upper ends of the masts. Fig. 13 is a view of the same from above. Fig. 14 is a vertical section, partly in elevation, showing the step for one of the masts.

Similar letters of reference indicate like parts in all the figures.

A is the deck of the vessel, and A' cast iron step-pieces firmly secured to the timbers in which are set the masts B, B, inclined toward each other and joined at the upper ends.

The main features of construction of the boom and masts are identical, and a description of the boom will suffice for both, excepting in such particulars as will be designated.

C is the boom, tapering in both directions from the mid-length, engaged at the base by a ball-and-socket joint.

C' is the ball, connected by the neck C² to a casting C³. It is seated in the concave socket A², secured to the deck timbers by bolts A³.

A⁴ is a cover made in halves, each bolted upon the socket casting to inclose the ball, and provided with a sufficient opening to allow freedom of motion to the neck C². The joint between the socket and its cover is inclined downward and outward, as shown, to allow the boom to be depressed to a more nearly horizontal position than could be ordinarily obtained.

C⁴, C⁴, are the T-rails of rolled iron or steel, extending the entire length of the boom. Their ends are flattened by upsetting, or otherwise, and are engaged in blocks or end-pieces C⁵, C⁵, of cast iron, properly formed to receive them, and secured in place by cup-shaped castings of steel C⁶, C⁶, the former carrying the ball C', above described, and the latter carrying a flattened and widened portion, provided with two holes a, a', in which are

engaged the hooks of the elevating block for the boom and the hoisting block for the load.

The rails are set with the webs c, c , inward on radial lines toward the center. I have shown six rails, equally spaced, and separated each from the next by a segmental spacing-block D, filling the intermediate space between each rail and the next, having each end shaped, as shown, to match against the adjacent rail, so that when all are in place a section at this point shows a complete circle made up of the spacing-blocks and rails, lying metal to metal. (See Fig. 3.) The radial thickness of the blocks is the same as the depth of the rail through the web, and the width corresponds to that of a steel retaining ring E, which latter is slid into position while hot from one end of the boom. In cooling, the ring shrinks, forcing the inclosed rails and blocks into close contact with each other, and binding the whole securely.

There may be as many rings and sets of blocks as may be found necessary or desirable. I have shown nine, equally spaced, diminishing in diameter and also in width to correspond to the taper of the boom and to the increased stiffness due to the gradual approach of the rails to each other toward the ends.

The masts are similar in general construction to the boom, but the rail ends are welded to the end-pieces. The end-pieces B^5, B^5 , at the upper ends are flattened, and provided with holes to receive bolts G' extending through the downwardly inclined wings G^3 of a cap forging G, provided on its under face with an abutment G^3 separating the ends of the masts and taking the strain of compression at this point which would otherwise be borne by the bolts G' .

Two rearwardly projecting lugs G^4, G^4 , are each drilled to receive a guy-rope fastened to the deck, or other fixed portion.

An eye H is mounted on the under side of the cap G, secured by nuts H^2 engaging the shank H' , which latter extends upward through the cap and is threaded to receive the nuts.

The lower end-pieces B^3, B^3 , of the masts are cylindrical, and engaged in inclined sockets in the anchor-pieces A' .

It will be understood that the guys, hoisting ropes, blocks and hoisting engine may be of any ordinary or suitable character, and are only partly represented in the drawings.

The blocks C^5, C^5 , are each cast in the form shown in Figs. 9, 10 and 11, with longitudinal grooves c^5, c^5 , to match the cross-section of the rails, and receive the latter so that their outer faces shall be about flush with the surface of the blocks. The grooves c^5 are enlarged at one end, forming offsets c^6 , engaging the upset ends c^4, c^4 , of the rails and lock them against displacement longitudinally.

A steel casting C^3 or C^6 of proper inside diameter is then applied hot over the rail ends and block, and allowed to cool in position,

shrinking as it cools, thus joining the inclosed portions and itself firmly together.

The advantages of the construction will be readily appreciated. By dispensing with a central core and arranging the spacing-blocks in the form of hollow rings at suitable intervals, the whole interior is left clear, thus greatly reducing the weight without detracting from the strength or stiffness.

Modifications may be made in the details without departing from the principle of the invention.

A greater or less number of T-rails may be employed with the spacing-blocks and rings set nearer together or at greater intervals than here shown, as may be found desirable or expedient in designing the derrick for carrying loads of greater or less weight. A boom sixty-five (65) feet in length, constructed in the proportions here shown, will safely sustain a load of sixty (60) tons.

The spacing-blocks D may be secured against liability to work loose by light bolts engaging them with the rails, but I do not consider such necessary, as the shrinking of the inclosing ring in cooling compresses the parts into close contact with each other, and binds the whole with absolute firmness. These blocks are for lightness cast hollow or open on one side, as shown, but may be solid, or otherwise formed, as the strength required to withstand the strain may determine.

Instead of the two masts shown, a single upright mast, properly guyed, may be employed if preferred.

I claim as my invention—

1. In a mast or boom for a derrick or like structure, the T-rails extending lengthwise and arranged circumferentially with the mid-flange inward, separated from each other by segmental spacing-blocks, in combination with the latter, and with the retaining ring embracing the rails and blocks, the whole forming a hollow framework, substantially as herein specified.

2. In a mast or boom for a derrick or like structure, the T-rails extending lengthwise and arranged circumferentially with the mid-flange inward, separated from each other by segmental spacing-blocks, having their ends formed to match to the contour of the adjoining rails, in combination with each other, and with the retaining rings embracing the rails and blocks, and the end-pieces inclosed by the rail ends and secured thereto, the whole forming a hollow framework, substantially as herein specified.

3. In a boom for a derrick or like structure, the T-rails extending lengthwise and arranged circumferentially with the mid-flange inward, separated from each other by segmental spacing-blocks, in combination with the latter, and with the retaining rings shrunk upon the inclosed rails and blocks, the end-pieces grooved to receive the rail ends, and the inclosing castings C^3 and C^6 shrunk upon said

end-pieces and rail ends, all substantially as herein specified.

4. The end-pieces C^5 having grooves c^5 , c^5 , to match the cross-section of the rail, offsets
5 c^6 , c^6 , engaging the enlargements c^4 , c^4 , on the rail ends laid in said grooves, in combination with each other and with the inclosing casting C^3 shrunk upon the said end-pieces and rail ends, substantially as herein specified.

10 5. In a derrick or like structure, the boom C and ball C' on its lower end, in combination with the concave socket A^2 having the plane surrounding surface inclined downwardly

and outwardly, as shown, and the cover plates A^4 and A^4 applied on such surface, all ar- 15
ranged to allow a wide range of motion to the boom without cramping, substantially as herein specified.

In testimony that I claim the invention above set forth I affix my signature in pres- 20
ence of two witnesses.

HERMON B. GATES.

Witnesses:

CHAS. E. SEARLE,
H. A. JOHNSTONE.