(No Model.) 2 Sheets—Sheet 1.

G. K. KIRKHAM.

COFFER DAM.

No. 418,726. Patented Jan. 7, 1890.

Fig: 1.

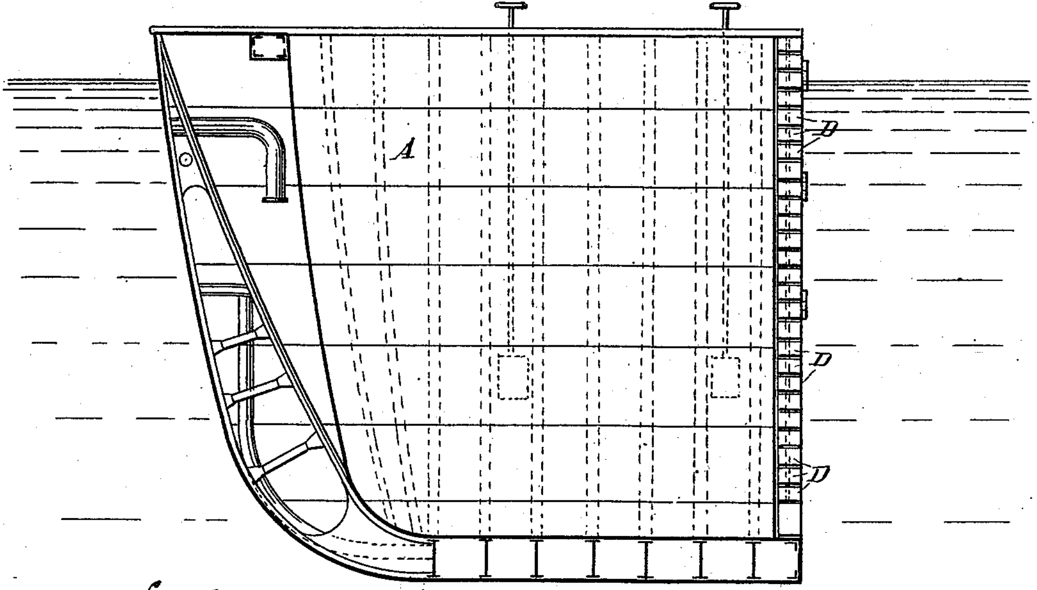
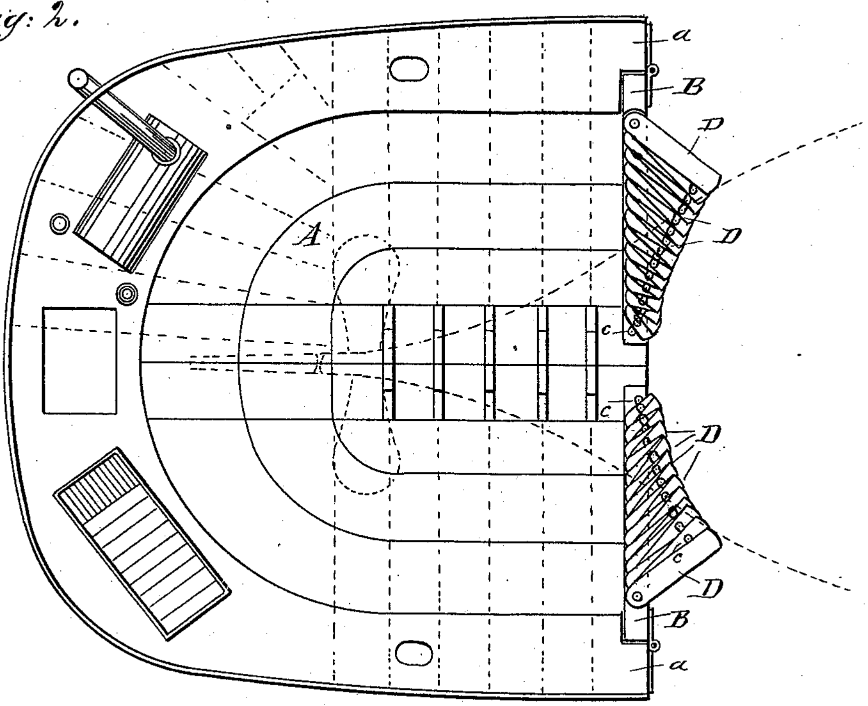


Fig: 2.



WITNESSES:

Chas. Nida

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INVENTOR:

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(No Model.) 2 Sheets—Sheet 2.

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Fig: 3.

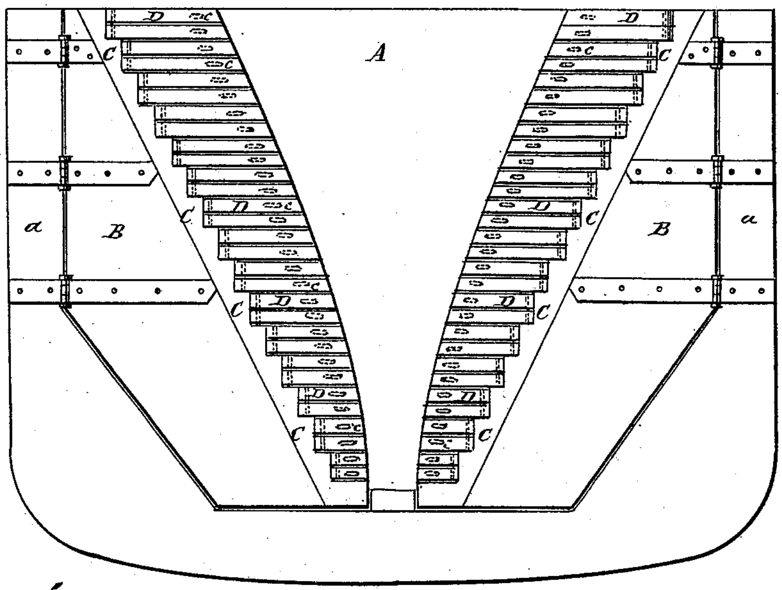


Fig: 4.

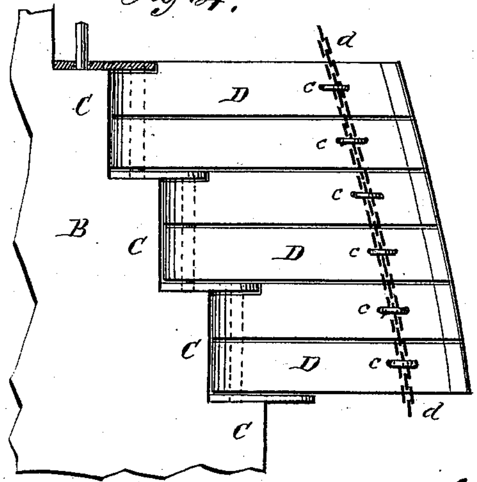


Fig: 5.

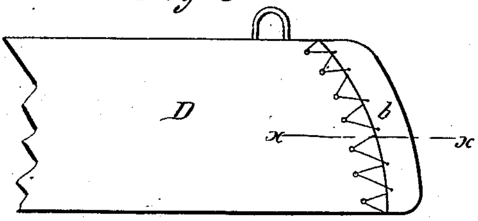


Fig: 6.

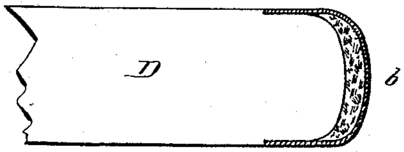
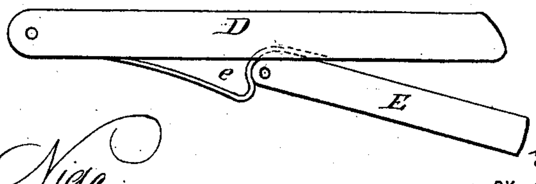


Fig: 7



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UNITED STATES PATENT OFFICE.

GEORGE K. KIRKHAM, OF BROOKLYN, NEW YORK.

COFFER-DAM.

SPECIFICATION forming part of Letters Patent No. 418,726, dated January 7, 1890.

Application filed May 14, 1889. Serial No. 310,736. (No model.)

To all whom it may concern:

Be it known that I, GEORGE K. KIRKHAM, of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Coffer-Dams, of which I declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to improvements in coffer-dams; and the invention consists of a coffer-dam having its gates constructed substantially in the manner herein described, shown, and claimed.

In the accompanying sheets of drawings, Figure 1 is a vertical section of the dam; Fig. 2, a plan of the same; Fig. 3, an end view; Fig. 4, a fragment of one of the gates; Fig. 5, a detail of one of the pivoted arms; Fig. 6, a section of the arm in the plane *x x*, Fig. 5. Fig. 7 shows a modified form of arm.

Similar letters of reference indicate like parts in the several views.

The purpose of this invention is to improve upon the construction of coffer-dams designed for the purpose of repairing vessels, &c.—that is, coffer-dams that may be towed to a ship needing repairs and placed under that part of the hull which may need repairing. These dams, generally speaking, are floated to the vessel, and their construction, consisting, in part, of an opening at one or two of their sides, permits the dams, after being submerged to some extent, to be hauled under the vessel, and then upon being freed from water they rise to the desired position beneath and about the hull. In order to render a dam of this construction satisfactory in its operation, it is essential, of course, that the water be excluded from the dam, and the difficulty heretofore has been to keep the water from entering between the edges of the opening A and the hull of the vessel within that opening. These edges are fashioned to the configuration of that part of the hull which is to be received in the dam, and the edges are then padded, and while this will render the dam tight it requires time and constant attention to make the joints between the vessel and the dam satisfactory, and it is to improve this fitting of the dam to the vessel that my present invention relates.

The openings in the dams of the character I have described have in some instances been provided with gates which were hinged to the sides of the dams, so that they could be closed against the hull of the vessel after the vessel had entered the dam. In other instances a series of thin and narrow strips of wood or arms have been pivoted to the sides of the dam, so that when the entire series were brought against the vessel the strips constituted gates.

In my present invention I combine both the solid gates and the strips before mentioned, as will more clearly appear by reference to the drawings, in which B represents solid gates hinged to the sides *a* of the dam. In the edges of these gates are cut offsets or steps C, and in these offsets are pivoted arms D, one, two, or more being pivoted in each offset. These arms at their outer ends (when the arms are all in the same plane) present an outline which conforms generally to the contour of the vessel's hull, as is shown in Fig. 3, and to the outer end of each arm D is fixed, by lacing or otherwise, suitable padding *b*, and also to each arm is secured an eye *c*, with a chain *d* rove through the eyes.

Now, when a dam is constructed substantially in the manner described, its gates B are swung open and the dam is floated beneath the vessel to be repaired. The gates B are next closed and the arms D are then, by means of the chains *d* or similar things, swung into position until the ends of the arms abut against the vessel's hull, where, by reason of the packing *b*, they form a tight joint, and so, together with the gates B, keep out the water and enable the dam to be pumped dry.

It will be seen that the arms D in fact constitute a prolongation of the width of the gates B, with the important advantage arising from the construction which permits the gates B, which close the larger part of the opening in the dam, to retain always a given fixed size and shape without reference to the size or shape of any particular vessel, while the arms D, being small and being easily cut to the requisite size and shape, can be pivoted to the gates, and by this means the gates be provided with edges which will fit with necessary tightness the vessel's hull.

When the opening in the dam is arranged to be closed wholly by a series of arms pivoted to the sides of the dam, or wholly by gates hinged to the sides, the adjustment of such arrangements to the hull of the vessel becomes difficult, expensive, and unsatisfactory; but when the gates and the arms are combined in the manner described, then the closing of the dam and fitting it to the vessel is quickly accomplished.

In some cases the outer ends of the arms D may have pivoted to them supplemental arms E, to form a prolongation of the arms D, or for other purposes. When this supplemental arm is employed, a heel-plate *e* may be used to make tight the joint between the end of the supplemental arm and the arm to which it is attached, as shown in Fig. 7.

Another special advantage arising from combining the gates B and arms D in the construction of my coffer-dam is this: When the opening in the dam is provided with a series of long and slender arms pivoted to the sides of the dam, then it is necessary to prolong the floor of the dam into a platform of dimensions sufficient to support the arms when opened outward. Otherwise they will break of their own weight, particularly in a seaway. When these arms, however, are but short extensions of the edges of the solid gates B, there is no need of the platform, since the gates afford all the support that is needed. The advantages therefore to be derived from the use of the arms in a coffer-dam are had by my construction without the use of the expensive and cumbersome platform to support the arms, as stated.

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

1. A coffer-dam provided with solid gates hinged to the sides of the dam, combined with series of arms pivoted to the edges of said gates, as and for the purpose described.

2. In a coffer-dam provided with solid gates hinged to the sides thereof, with offsets formed in the edges of the gates, series of arms pivoted to the offsets in said gates, as and for the purpose described.

GEORGE K. KIRKHAM.

In presence of—
D. A. CARPENTER,
E. C. SMITH.