(No Model.) 2 Sheets—Sheet 1.

J. EDWARDS & J. R. F. KELLY.

DREDGING APPARATUS.

No. 366,468. Patented July 12, 1887.

Fig. 1.

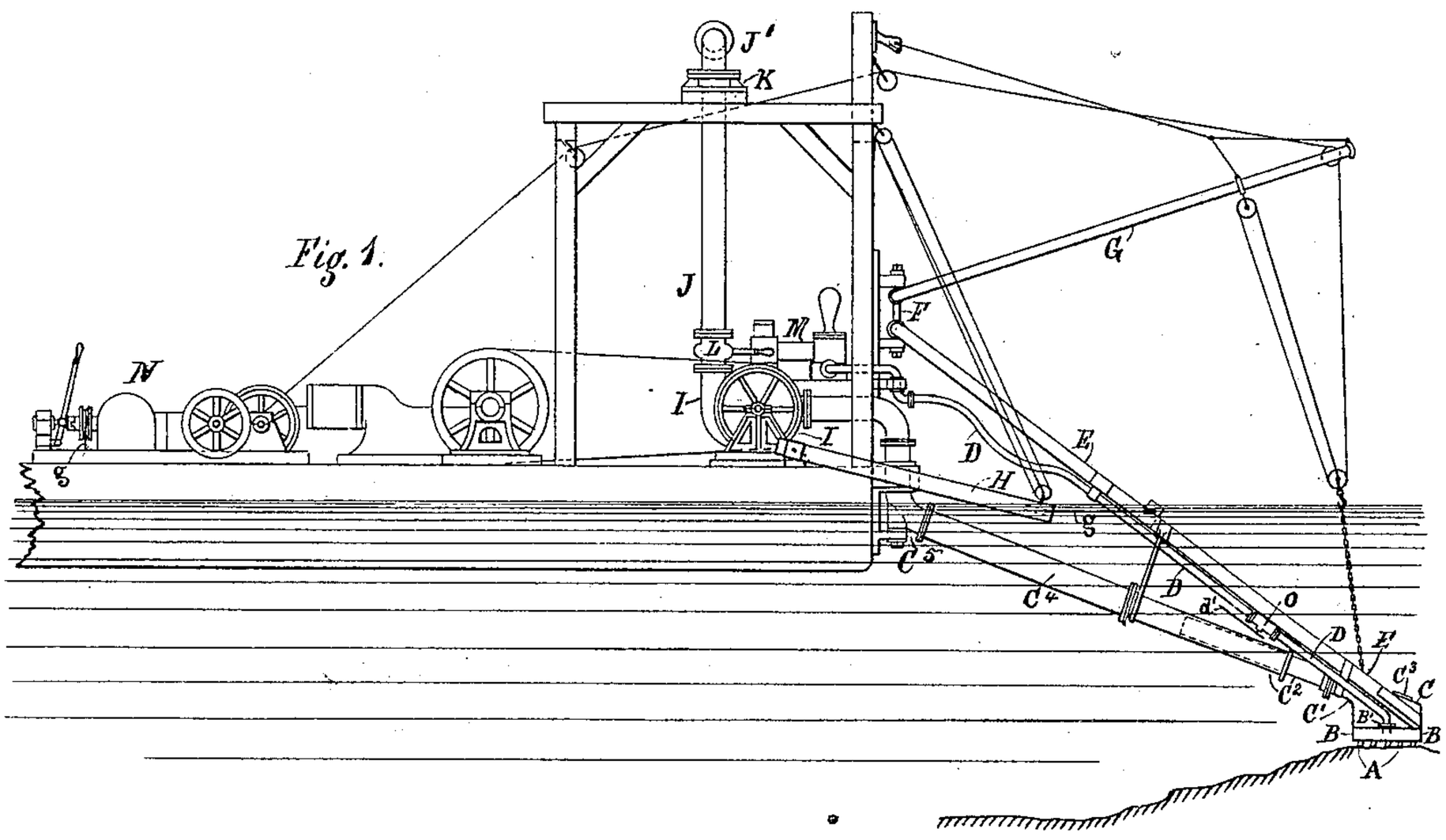
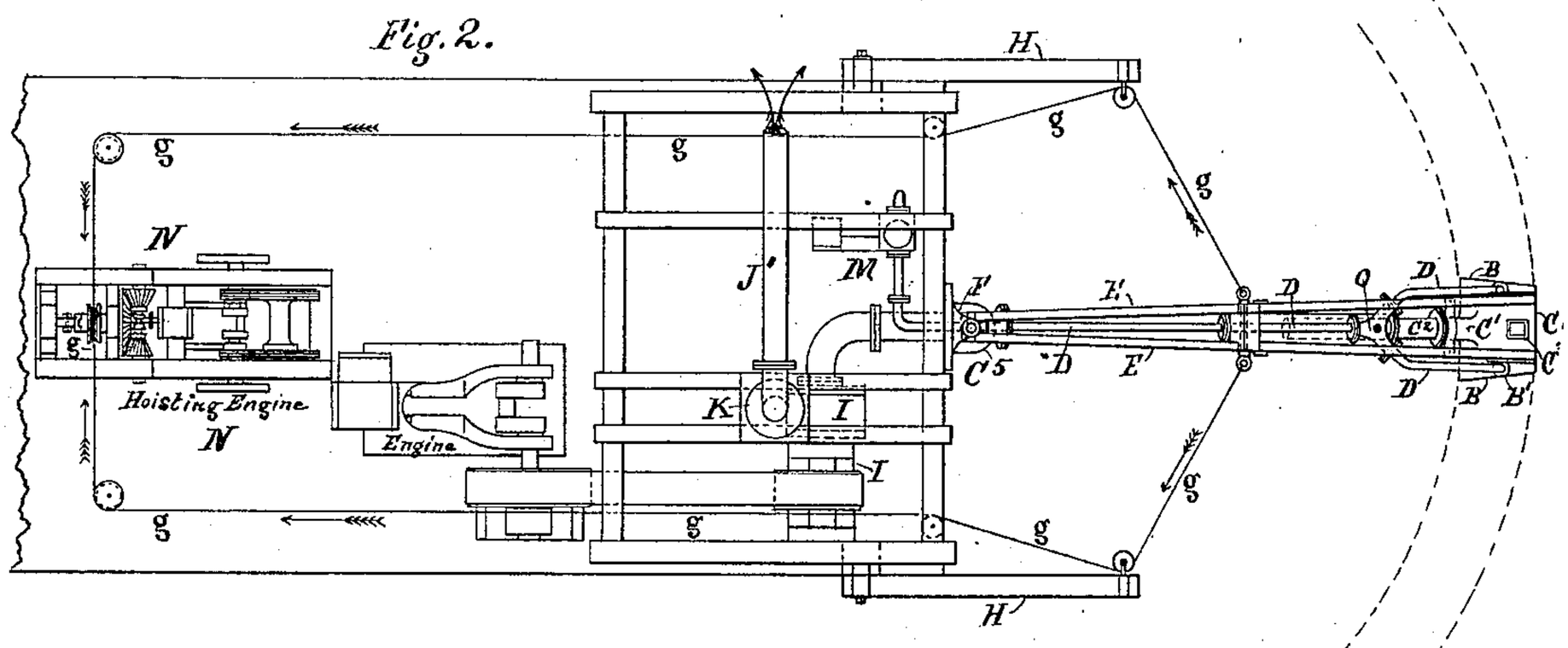


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

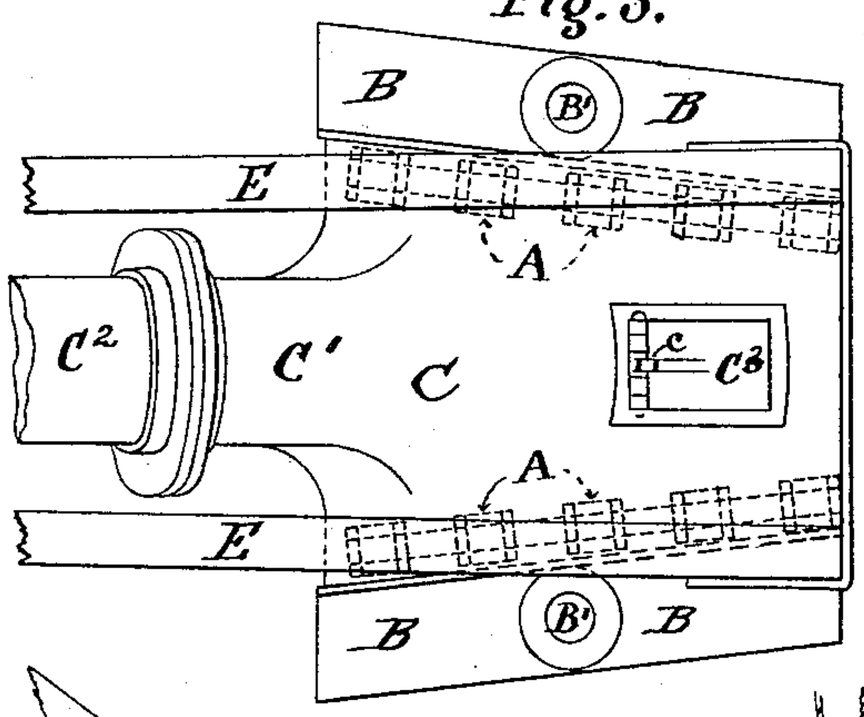


Fig. 4

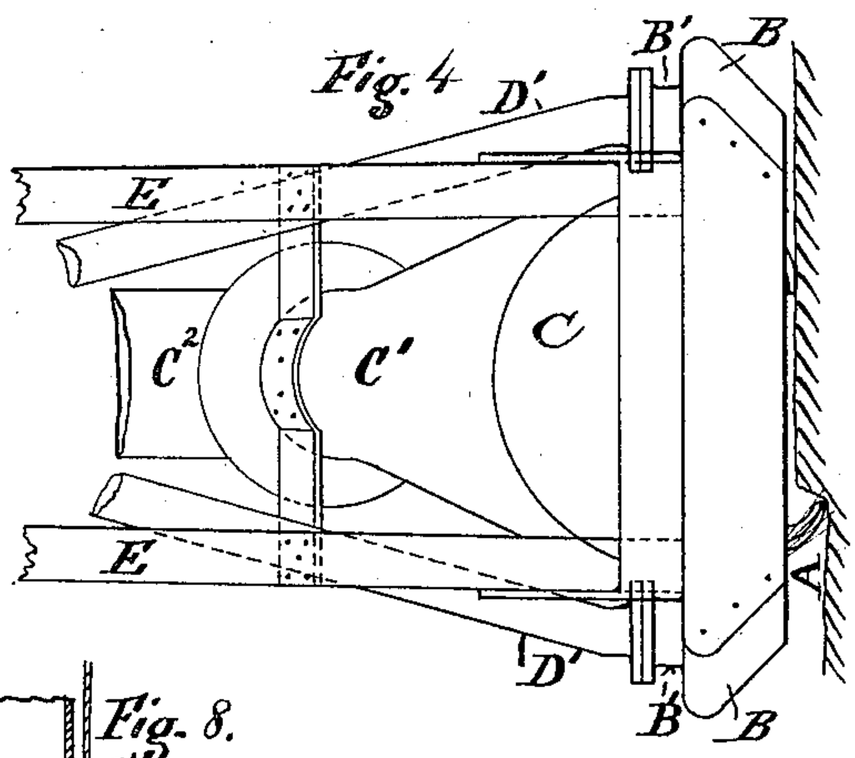


Fig. 5.

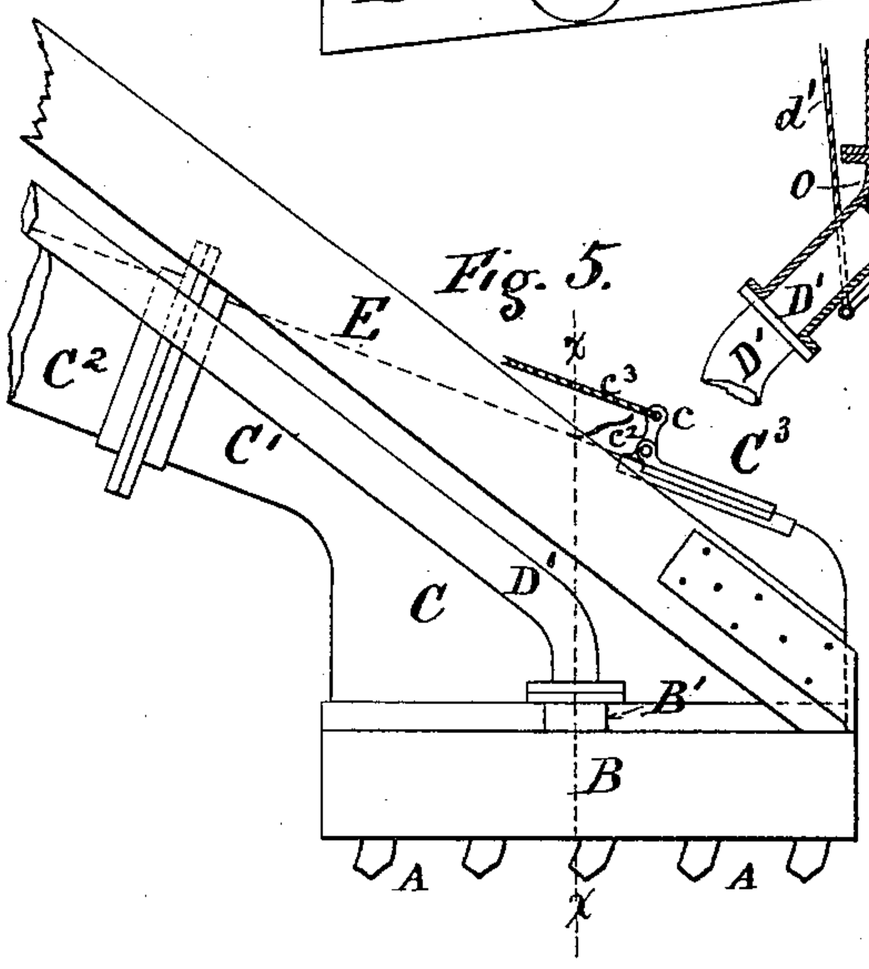


Fig. 8.

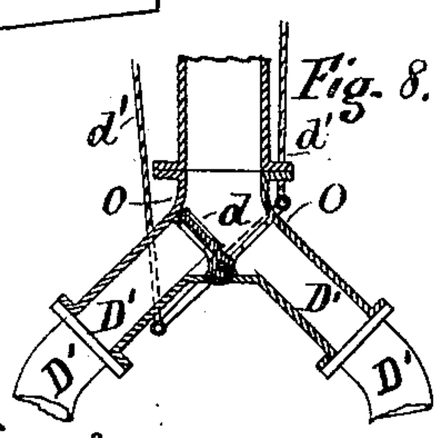


Fig. 6.

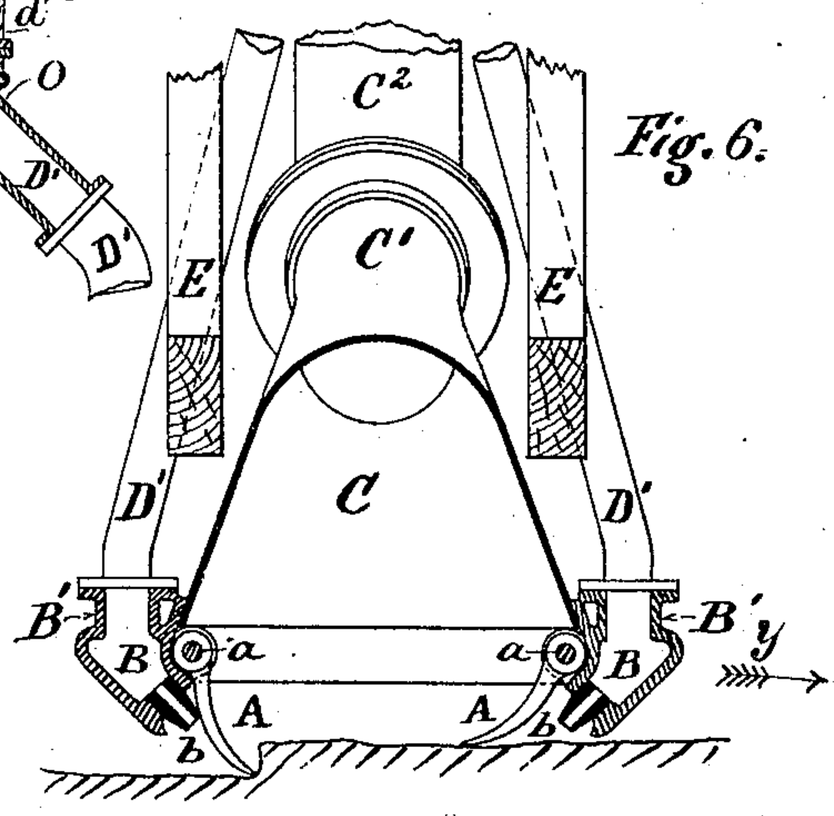
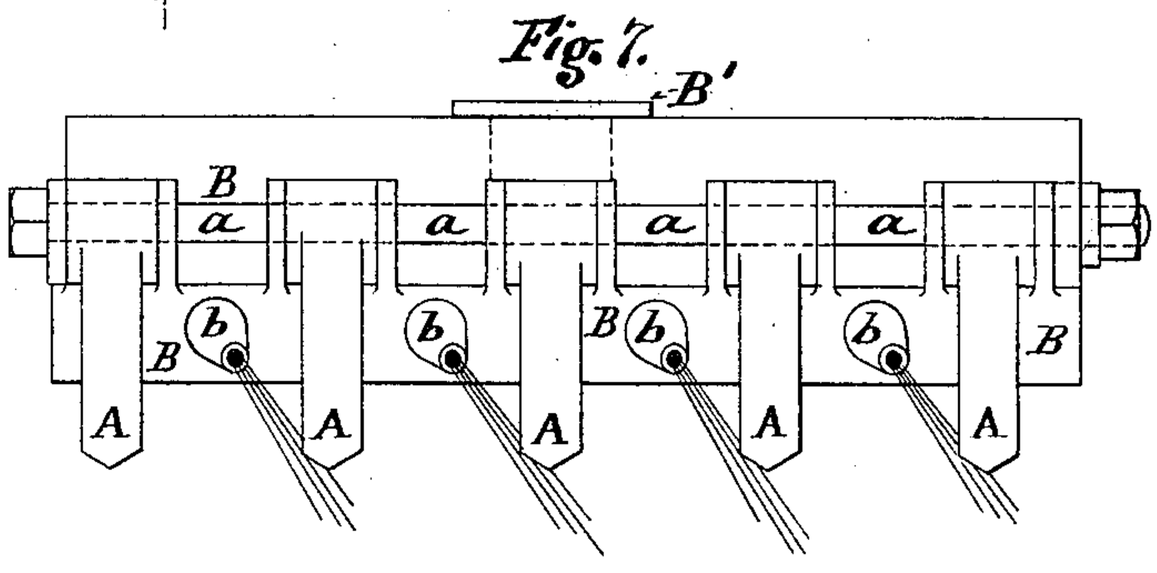


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOSEPH EDWARDS AND JAMES R. F. KELLY, OF BROOKLYN, NEW YORK.

DREDGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 366,468, dated July 12, 1887.

Application filed February 14, 1887. Serial No. 227,562. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH EDWARDS and JAMES R. F. KELLY, citizens of the United States, residing in Brooklyn, Kings county, and State of New York, have invented certain new and useful Improvements in Dredging Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

Certain improvements consist specially in a dredging-drag composed of a series of loosely-suspended diggers or plows, by means of which the earth or mud at the bottom of a river or harbor is loosened, of a series of pressure-jets arranged in conjunction with the loosely-suspended diggers or plows, by means of which a constant abrasion of the loosened mud or earth is brought about, and of an inverted funnel or nozzle to which the said diggers and jet-nozzles are attached, and up through which by suction the loosened material, mingled with water, is withdrawn for deposit elsewhere.

Certain improvements also consist in a special supporting frame-work projected from the dredging end or side of a staging, scow, or vessel directly to the dredging-drag, through which all support and necessary movement is conveyed in the operation of said drag, thereby preventing any direct or undue strain from coming upon the drag itself, the suction or discharge connections, the pressure-connections for jets, or upon the several bearings, swivels, and steps of the same.

Other improvements consist in the combination of the several portions or details, collectively or with each other, of which the dredging apparatus is composed, as may hereinafter be described or claimed.

In the drawings, Figure 1 represents a general elevation of a dredging apparatus embodying our improvements. Fig. 2 represents a plan view of the same. Figs. 3, 4, and 5 represent a plan, front and side view of a dredging-drag presenting improved details of construction and method of operation. Fig. 6 represents a transverse section on line *x x* of Fig. 5 and through one of the jets, showing preferred method of putting the parts together. Fig. 7 is an enlarged view of manifold with four jets attached thereto and five diggers suspended from the same. The number of jets and loosely-suspended diggers may be increased to suit the nature of the bottom to be worked. The radial lines from jet-nozzles show method of directing the jets in their work. Fig. 8 is a detail view of flap-valve for supplying pressure to jets in either manifold to suit direction in which the work is being done.

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

A designates the loosely-suspended diggers; B, a pair of manifolds to which the jet-nozzles are secured, varying in size and number according to the nature and amount of discharge required.

C is an inverted funnel strongly framed, to which the manifolds B are attached, and from and within which the diggers are suspended. This inverted funnel C is formed, preferably, with an easy taper to the nozzle, up through which by direct suction the disintegrated material mixed with water is drawn. To prevent choking the suction, a water-valve, C^3, is attached to the upper portion of inverted funnel, and when too much material and too little water gets into the suction-pipes an extra and independent supply of water can be secured. To supply the manifolds with pressure, preferably of water, the inlets B' and connections D' to pressure-pump are provided, the connections D being made flexible, preferably of rubber.

In the section, Fig. 6, a pair of manifolds are represented as attached to the siding of the inverted funnel C, and branch connections D' provided for each. These branch connections are continued up toward the vessel or scow and brought together at earliest opportunity in a Y-connection, as shown at O in Figs. 1, 2, and 8, and a flap-valve, *d*, (see Fig. 8,) set at the junction of the arms to control the inlet to either of the connections leading to manifolds B. The flap-valve *d* is controlled automatically or by power applied from the scow, staging, or vessel. As represented in the drawings, Fig. 8, the flap-valve *d* has a double handle, to the two ends of which hold is taken through cables *d'*, either one of which being pulled closes the opposite branch connection leading to manifolds.

The water-valve C^3 may be a balanced valve,

which, upon internal suction being reduced, owing to the choking of the suction-connection, opens and admits a special supply of water automatically, or it may be operated as shown in Fig. 5, where hold is taken of the handle by cable or rod c^3 at the handle c. The maximum of weight being on the side of the valve, it will shut as soon as released and open when a strain is put upon the cable. A spring, c^2, may be located behind the valve to assist in the closing, or the suction of the funnel may assist.

The manifolds B are shown set at an angle to each other and to the radius of movements, (see Fig. 3;) but the funnel C may be shaped to suit choice or requirements, the neck C′ being of any suitable length, and the manifolds and diggers attached below, as shown in Fig. 6.

To effect necessary movement or travel of the dredging-drag and provide for its successful operating, a supporting frame-work, as shown at E, is attached to it and continued to a staging on shore or to a scow or vessel on water, as may be necessary. Here the frame-work is attached to a self-adjusting hanger, F, to permit of radial movement in any direction. The framing being stiff and non-elastic and being rigidly attached to the drag, takes all the thrust and strain of movement and work and relieves the several flexible connections and bearings from undue strain. A boom, G, is similarly connected to the vessel and extended upward and outward above the drag-framing E, from which the drag, by means of cables, is raised or lowered, as required. Side cables, g, are provided and connection made with hoisting engine or power to move the drag in a circular path, controlled by central attachment, F. These cables g are attached to framing E well down toward the drag, and the direction of their pull is controlled by the adjustable side timbers, H. These timbers are raised and lowered at their outer ends to suit depth of water and angle of bearing timbers or framing E. To provide for a free movement of the drag, a telescopic expansion-joint, C^2, in the suction-connection permits of extension or shortening, as required. A rubber suction-hose forms part of suction-connection at C^4 to accommodate varying depth of water and cut. These several portions are securely suspended from or attached directly to the frame-work E. Beyond the branch connections O of the pressure-pipes a flexible connection, D, is made to accommodate the varying reach and depth of dredging already referred to. Both suction and pressure connections are preferably provided with swivel-joints, as at C^5, attached to the vessel, placed in direct center line of drag movement and frame-center F.

A suction-pump, I, is placed on the vessel and connection made with suction-funnel of the drag. A discharge-pipe, J, is erected to connect with pump I, and is provided with a swivel-joint, K, and swinging branch J′. This branch J′, being swung upon swivel-joint K, permits of a free discharge in any direction radiating from K as a center.

To operate the apparatus, pump I, preferably a cataract or pulsometer pump, is started, with the discharge-valve L in pipe J partially open, and such opening is gradually increased until full suction is obtained. The force-pump M is operated to supply pressure for jets b, and the drag being lowered to place, the side timbers, H, are adjusted to a direct pull of the cables g in either direction and the drag moved to and fro upon F as a center. The diggers A are loosely suspended from rod a, and, being backed by the manifold and funnel-framing in their work, drop by gravity into position for digging. Under such circumstances, when the drag is moving in a direction as indicated by arrow y, Fig. 6, the left-hand set of diggers drop to their work, while the right-hand set drag idly over the surface of river-bottom, and vice versa, with the movement of the drag. In either case the flap-valve d of connection O is swung to suitably operate the jets upon the diggers while at work. Thus the diggers loosen the earth or mud, the jets break it up and mix it with water, and the suction, drawing it up, passes it through the discharge-connections, to be deposited in any direction from the vessel.

What we claim as new, and desire to secure by Letters Patent, is—

1. A dredging-drag consisting of an inverted suction-funnel, to the lower portion of which are attached manifolds provided with jet-nozzles and a series of loosely-suspended diggers, substantially as set forth.

2. A dredging-drag consisting of an inverted suction-funnel, to the lower portion of which are attached manifolds provided with jet-nozzles, and a series of diggers loosely suspended within said inverted funnel, in combination with a relief water-valve, substantially as and for purposes specified.

3. A dredging-drag consisting of an inverted suction-funnel, to the lower portion of which are attached manifolds provided with jet-nozzles and a series of loosely-suspended diggers, in combination with means for raising, lowering, and placing the same, substantially as shown and described.

4. In combination with a dredging-drag consisting of an inverted suction-funnel, to the lower portion of which are attached manifolds provided with jet-nozzles and a series of loosely-suspended diggers, the supporting frame-work to which said dredging-drag is attached, the swing-center F, and means for operating the same, substantially as set forth.

5. In a dredging-drag, the combination of an inverted suction-funnel, a series of manifolds, B, provided with jets b, and a series of loosely-suspended diggers suspended directly from said manifolds, substantially as set forth.

6. In a dredging apparatus, the combination of the dredging-drag herein shown and described, expansion-joint C^2, flexible joint C^4, swivel-joint C^5, and pressure-connections D, O,

and D′, substantially as and for purposes set forth.

7. In a dredging apparatus, the combination of a dredging-drag of the character herein shown and described, pressure-connections D, branching connections O, side connections, D′, and manifolds B, substantially as and for purposes specified.

8. In a dredging apparatus, in combination with a dredging-drag consisting of an inverted suction-funnel, to the lower portion of which are attached manifolds provided with jet-nozzles and a series of loosely-suspended diggers, supporting frame-work E, carrying said drag, boom G, a vessel or staging to which said supporting frame-work and boom are attached, and means for raising, lowering, and operating said drag, substantially as set forth.

9. In a dredging apparatus, the combination of the dredging-drag herein shown and described, suction-connections C^2, C^4, and C^5, water-valve C^3, pressure-connections D, O, and D′, suction-pump I, and pressure-pump M, all substantially as and for purposes set forth.

10. In a dredging apparatus, the combination of a dredging-drag of the character herein specified, suction-connections C^2, C^4, and C^5, suction-pump I, discharge-connections J and J′, and swivel-joint K in discharge-connection J, substantially as and for purposes specified.

11. In a dredging apparatus, the combination of a dredging-drag of the character herein specified, a supporting frame-work, E, suction and pressure connections, as specified, suction-pump I, pressure-pump M, and discharge-connections J and J′, provided with a swivel-joint, K, substantially as and for purposes specified.

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JAMES R. F. KELLY.

Witnesses:
WM. H. WEIGHTMAN,
M. E. ROBERTS.