

J. R. BENJAMIN.
SUBMARINE EXCAVATOR.

No. 43.664.

Patented Aug. 2, 1864.

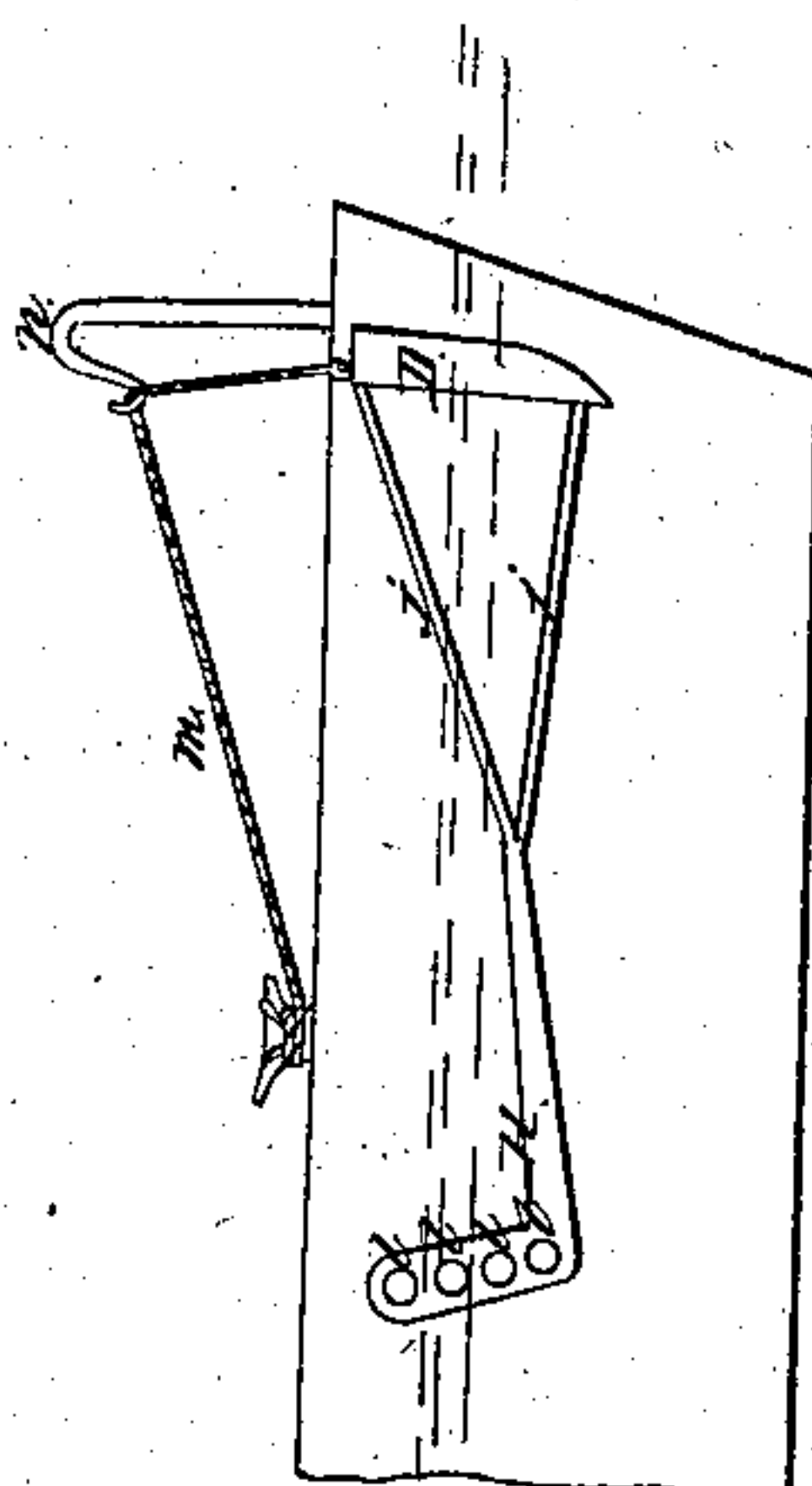
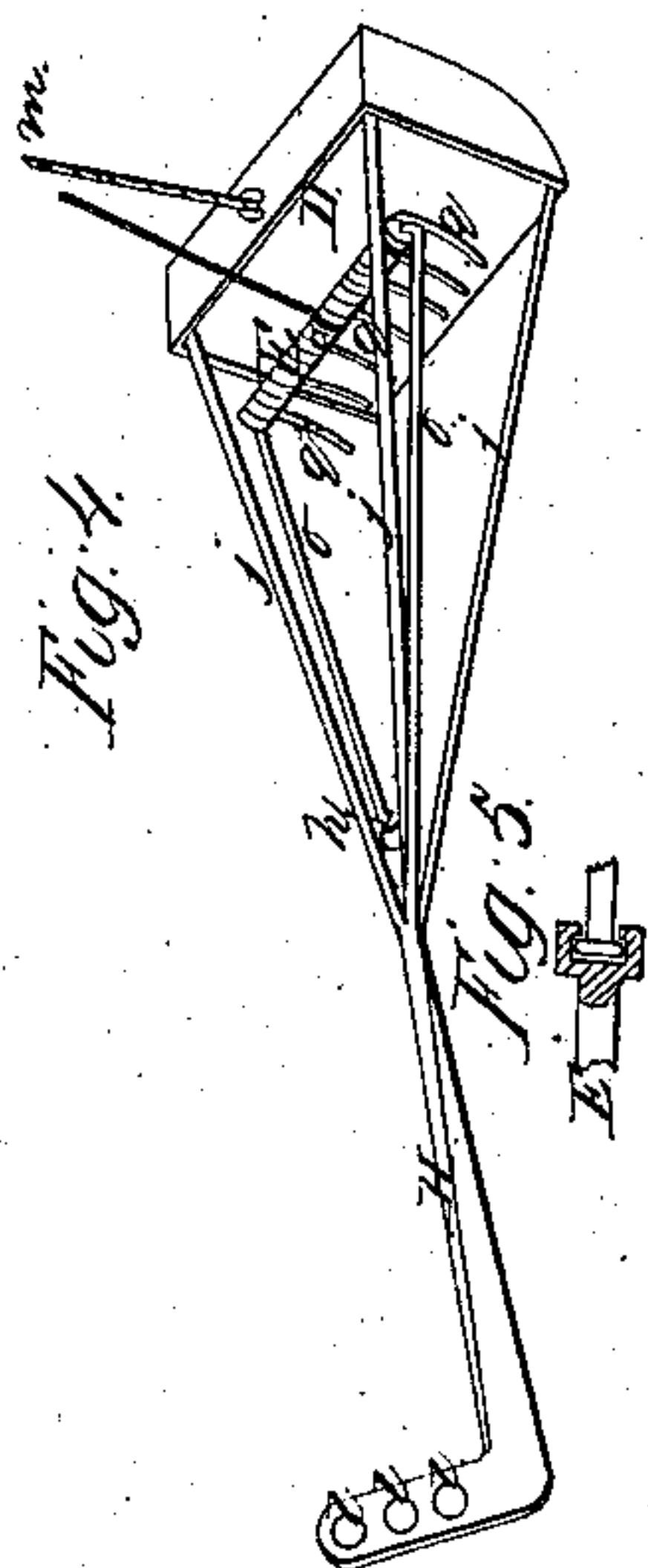
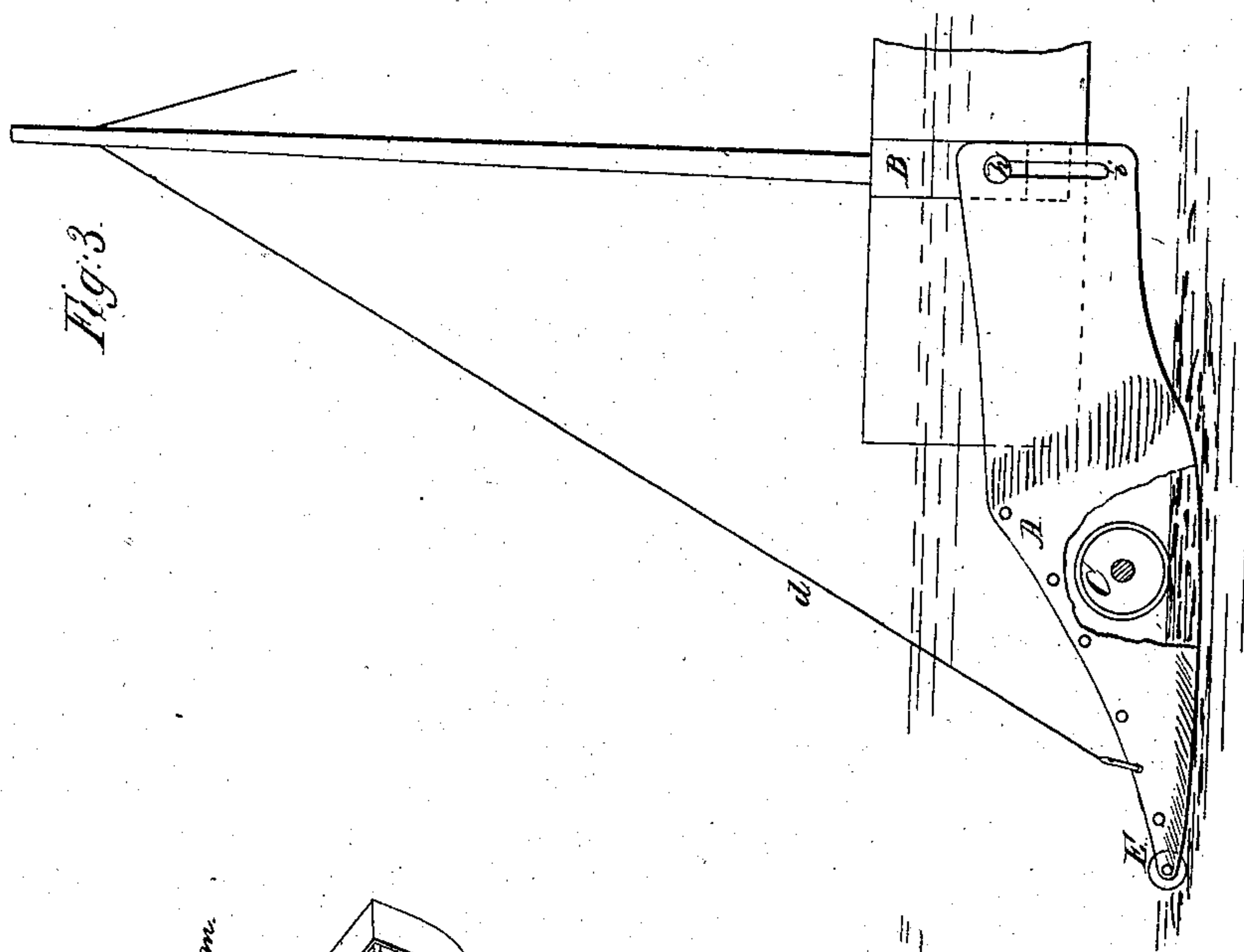


Fig. 1

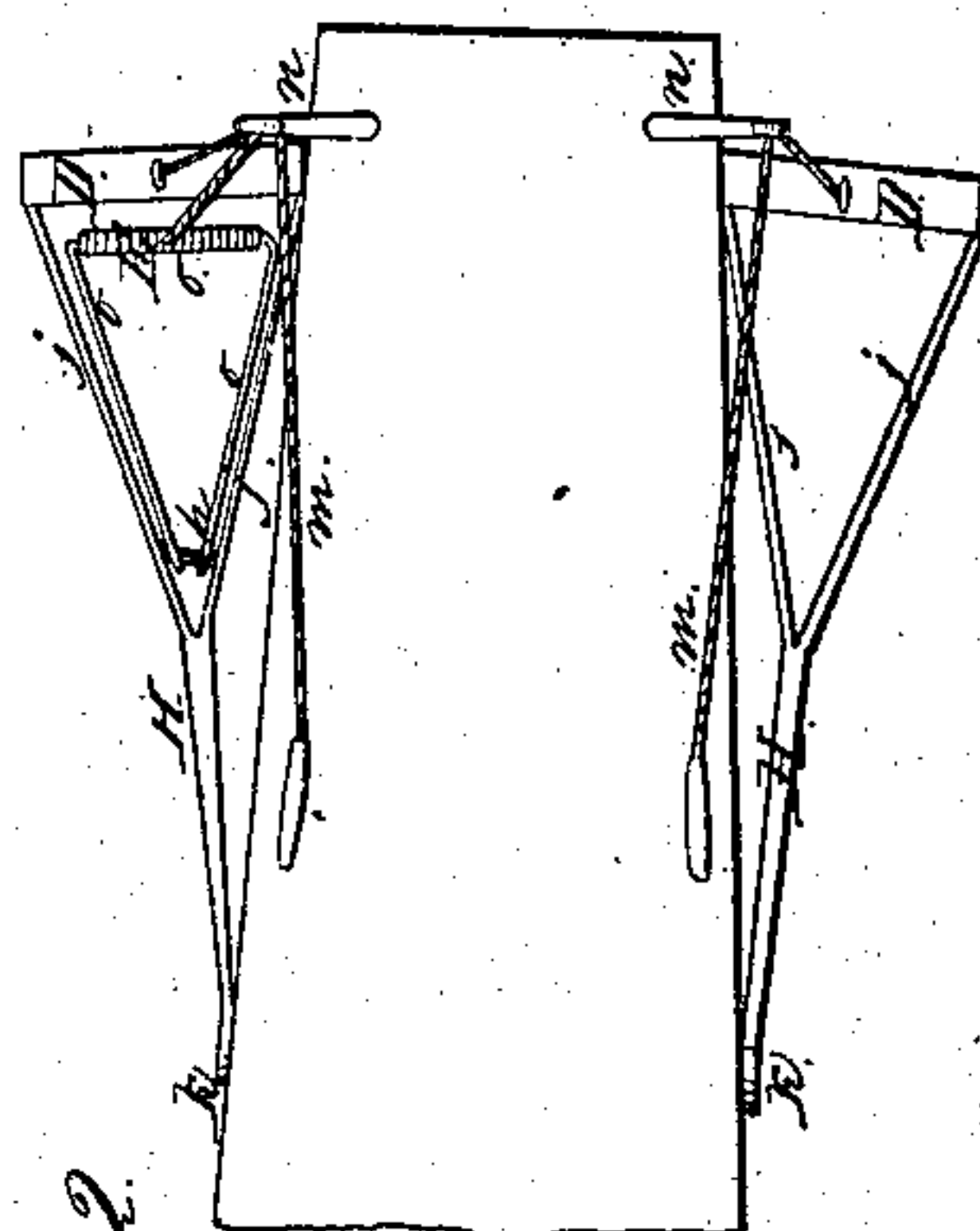
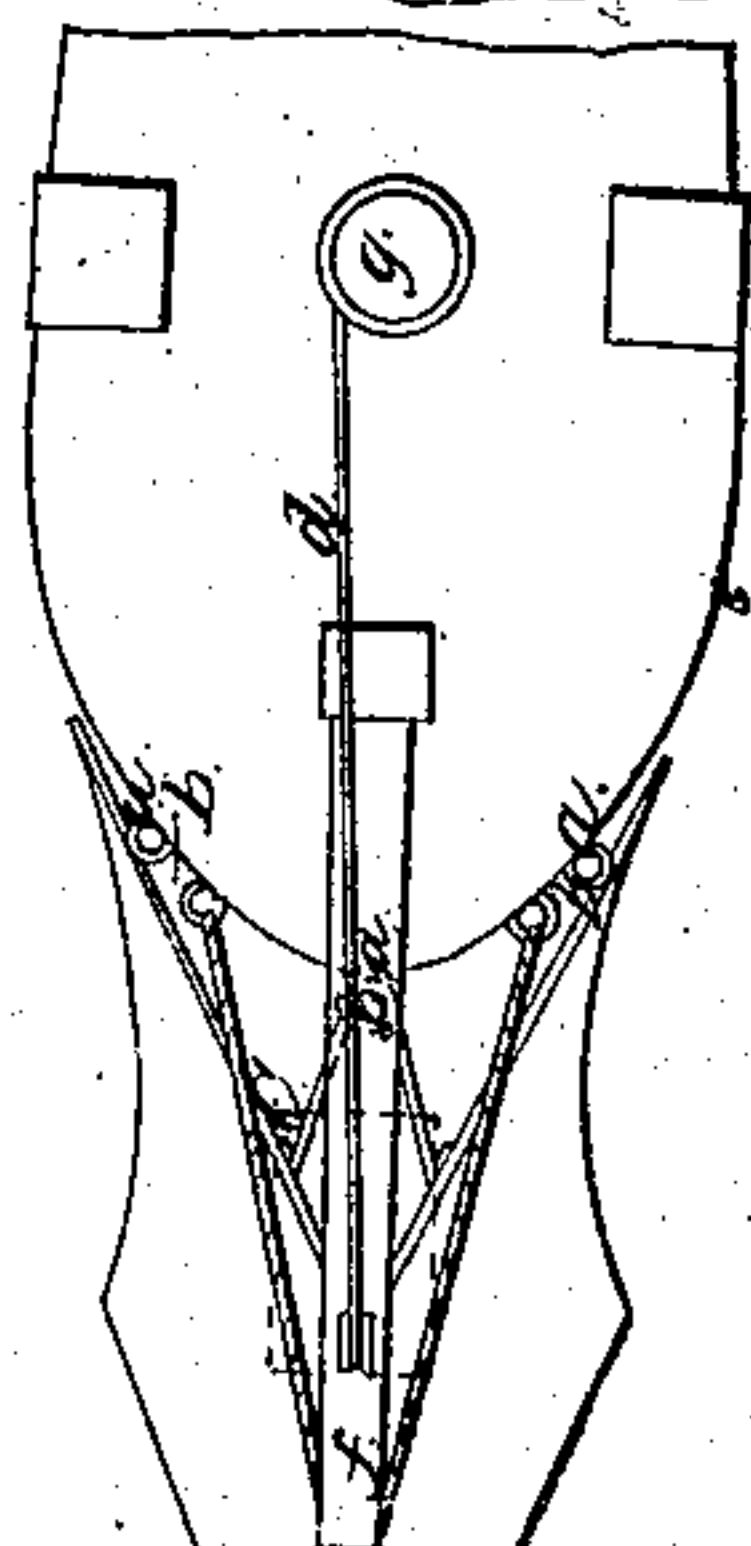


Fig. 2



Inventor;
J. R. Benjamin

Witnesses;

J. M. Hamara
Geo. H. W.

UNITED STATES PATENT OFFICE.

J. R. BENJAMIN, OF NEW YORK, N. Y.

IMPROVEMENT IN SUBMARINE EXCAVATORS.

Specification forming part of Letters Patent No. 43,664, dated August 2, 1864.

To all whom it may concern:

Be it known that I, J. R. BENJAMIN, of the city, county, and State of New York, have invented a new and Improved Submarine Excavator; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1 and 2 represent side elevations of my improvement; Fig. 3, a plan view of the same; Fig. 4, a perspective view of the digger and scraper; Fig. 5, a diagram showing the swivel.

Similar letters of reference indicate like parts.

The object of this invention is to facilitate the removal of sand bars and all kinds of obstructions in rivers and harbors; also, to deepen the same and open or cut new channels, whenever desired, below the surface of the water.

In carrying out my invention I employ a suitable steam-propelled vessel, preferably one having a wheel or propeller at the stern, and upon the bow of the vessel I arrange a large excavator, A, made somewhat in the form of a plow, (see Fig. 1,) and having a vertical movement upon the bow. The shares of the excavator are intended to extend laterally beyond the side lines of the vessel. The front of the bow of the vessel is provided with three vertical fixed rods, *a a a*, firmly attached to the bow in any suitable manner, and occupying the position shown in Fig. 1. Fastened upon the inside of the plow-shares there are guiding eyes or loops *b b b*, through which the rods *a a a* pass, as shown. The rods and loops serve to hold or fasten the rear of the excavator to the bow, and they also permit the rise and fall of the excavator. At the point or front, or front upper junction, of the shares is a loop, *c*, to which is attached a chain or cord, *d*, extending over a pulley, *e*, in the bowsprit, *f*, to a windlass or capstan, *g*, by turning which the excavator may be raised or lowered at pleasure. Any other suitable raising device may be employed in lieu of the capstan *g*.

Fig. 2 represents a modification of the excavator and of the mode of attaching the same

to the vessel. In this figure the point of the plow is considerably elongated, and the shares are also extended rearwise, so as to embrace or fit the sides of the bow, to which they are attached by pivots *h*, one upon each side of the bow, the said pivots being fastened to vertical plates B, secured upon the sides of the vessel, as shown. The rear ends of the shares (shown in Fig. 3) are provided with vertical slots, *i*, which permit a vertical movement of the excavator, and the latter is drawn up or lowered by a windlass or other suitable lifting device, and cords or chains to be attached to the rear ends of the shares.

The elevation or depression of the front end of the excavator shown in Fig. 3 is effected by means of a chain or rope, *d'*, passing from the front end of the excavator up over a pulley in a mast or other suitable spar, as shown in Fig. 3.

Referring now to Figs. 1, 2, 3, in order to prevent the excavator from sinking too far into the sand or earth, I arrange upon the inside of the shares a broad wheel, C, journaled between the shares, as shown. The journal-boxes may be provided with screw adjustments in any of the well-known ways, so that the wheel C may be set higher or lower within the shares, and the depth to which the excavator sinks or cuts may thus be conveniently regulated.

In order to assist the excavator to rise and pass over any obstruction of a hard nature that it may encounter, I provide the point of the excavator with a wheel, E, made of steel or other hardened material and attached to the excavator in the firmest manner.

When set for operation, the excavator A is lowered or dropped below the bottom line of the vessel, and as the latter advances the excavator will penetrate and push sidewise in two furrows the earth, sand, or other obstructions that are in its path, and the vessel will pass between the furrows thus formed. If the excavator strikes a rock or other solid obstruction, the wheel E will mount the side thereof and the excavator will be forced upward, and the pilot of the vessel, by observing the slacking of either of the ropes *d d'*, will be warned of the obstruction and enabled to stop and back the vessel, and thus prevent injury thereto.

In order to facilitate the removal of the fur-

rows thrown up by the excavator, I arrange upon the after part of the vessel, upon each side thereof, a swinging scraper, D, made somewhat in box form, as shown, and attached by arms *j* and an adjustable elbowed arm, H, and pivoted at *k* to the side of the vessel. The arm H is provided with a series of adjusting-holes, *e*, through any one of which the pivot *k* may be inserted, so as to vary the adjustment of the arm H at will. The scraper D is raised and lowered by means of a chain or rope, *m*, which is attached to the upper part of the excavator, as shown, and passes up over a stanchion, *n*, upon the vessel to a suitable belaying-pin, or to a windlass or other hoisting device.

In order to permit a self-adjustment of the scraper D to suit the nature of the surface over which it scrapes, I propose to introduce a swivel-joint (see Fig. 5) at some convenient place in the arm H.

When the scrapers D are lowered for operation, they act upon the furrows thrown up by the excavator and remove the said furrows by the advance of the vessel into deeper water.

In some cases, when the sand or earth is of a close or tenacious character, I employ a device, which I term a "digger," in connection with the scraper D. (See Fig. 4.)

F is the digger, consisting of a triangular frame, *o*, which is pivoted or hung at *p* to the arms *j* of the scraper D, as shown. Upon the back end of the frame *o* there are a series of strong teeth, *q*, made somewhat like the teeth of a spring hay-rake. These teeth act in front of the scraper and they easily penetrate and loosen the sand or earth so that it may be

readily removed by the scraper D; but the said teeth yield when they encounter any very hard substance. The rear end of the digger F is connected by a short chain or rope, which lifts the scraper D, so that both scraper and digger may be simultaneously lifted or adjusted.

I do not limit myself to the precise formation, construction, or arrangement of the parts herein shown and described, as that may be varied in many ways to suit the especial character of the work to be executed.

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

1. The combination of the excavator A with the bow of a vessel, substantially in the manner herein shown and described.

2. The point-wheel E, in combination with the excavator, as and for the purpose herein shown and described.

3. The employment of the wheel C within the excavator A, substantially as and for the purpose herein shown and described.

4. The employment of the swinging scrapers D, constructed and operating substantially as herein shown and described.

5. The combination of the digger F with the scraper D, substantially in the manner and for the purpose herein shown and described.

6. The combination of the bow excavator A and the side scrapers, D, substantially in the manner and for the purpose herein shown and described.

J. R. BENJAMIN.

Witnesses:

THEO. FUSCH,

M. M. LIVINGSTON.