(No Model.) 2 Sheets—Sheet 1.

T. F. LONNEY.

SUBMARINE ROCK BREAKER.

No. 303,392. Patented Aug. 12, 1884.

Fig. 2.

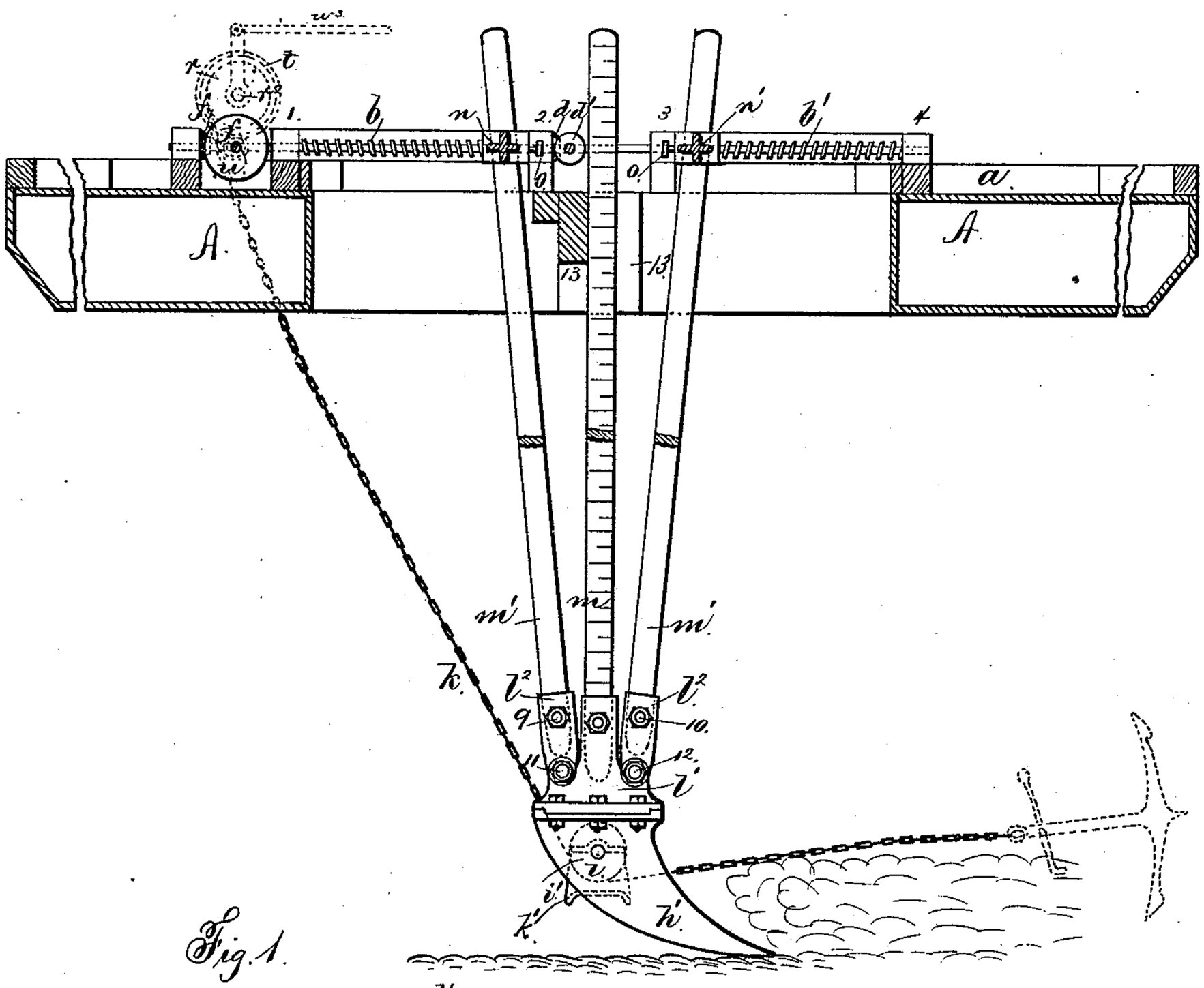
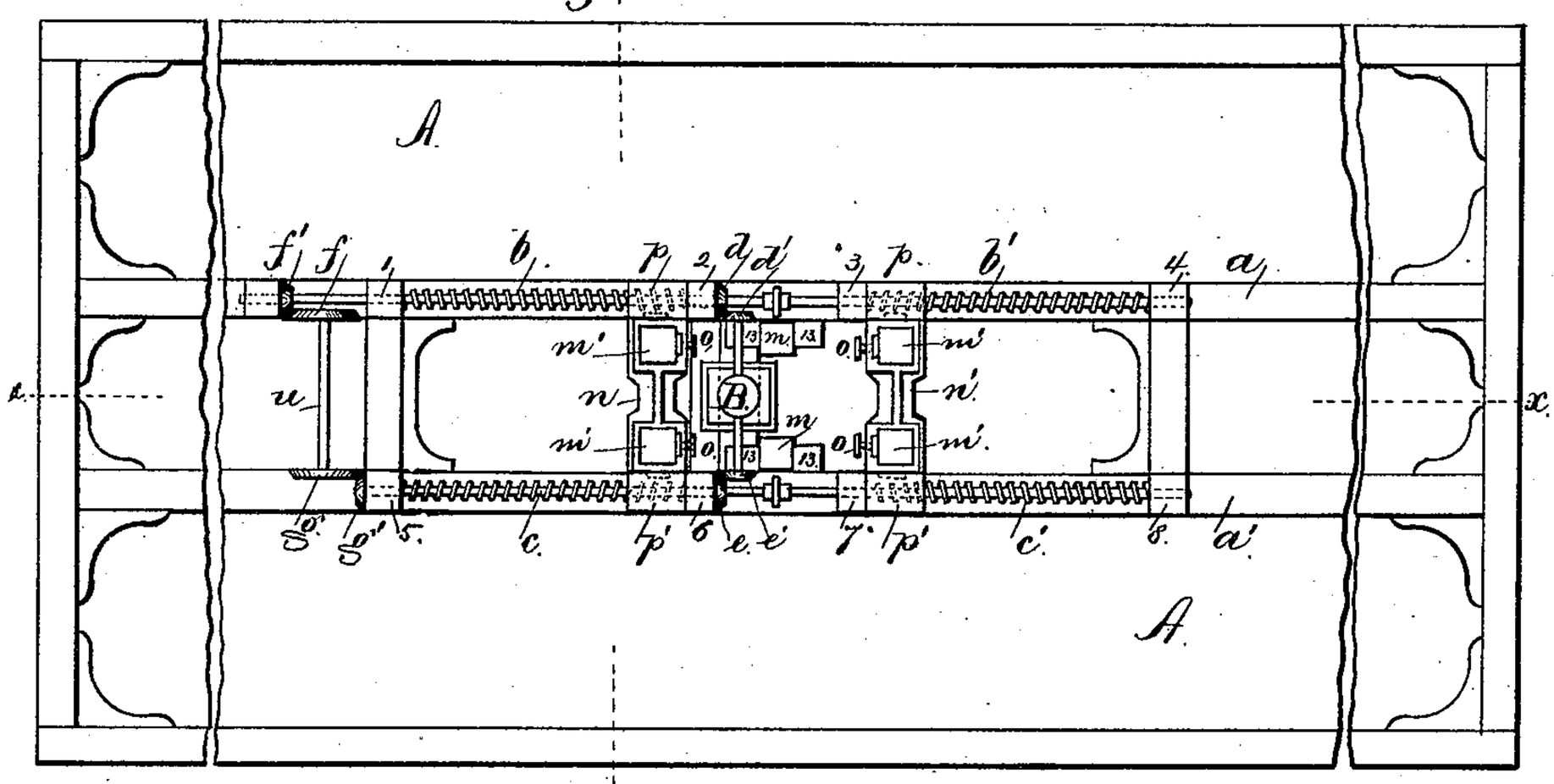


Fig. 1.



y.

Witnesses
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(No Model.)

2 Sheets—Sheet 2.

T. F. LONNEY.

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Fig. 3.

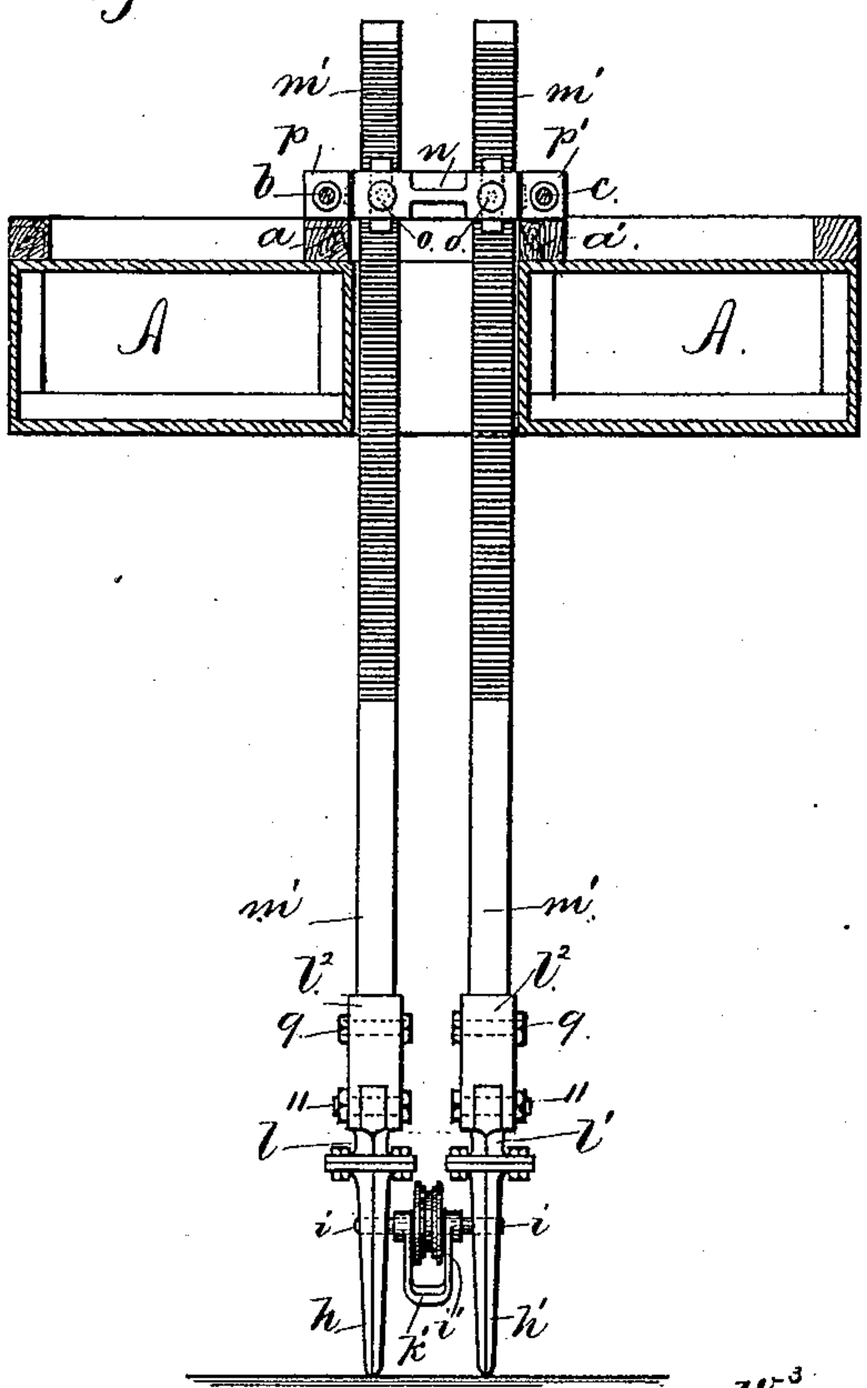


Fig 5.

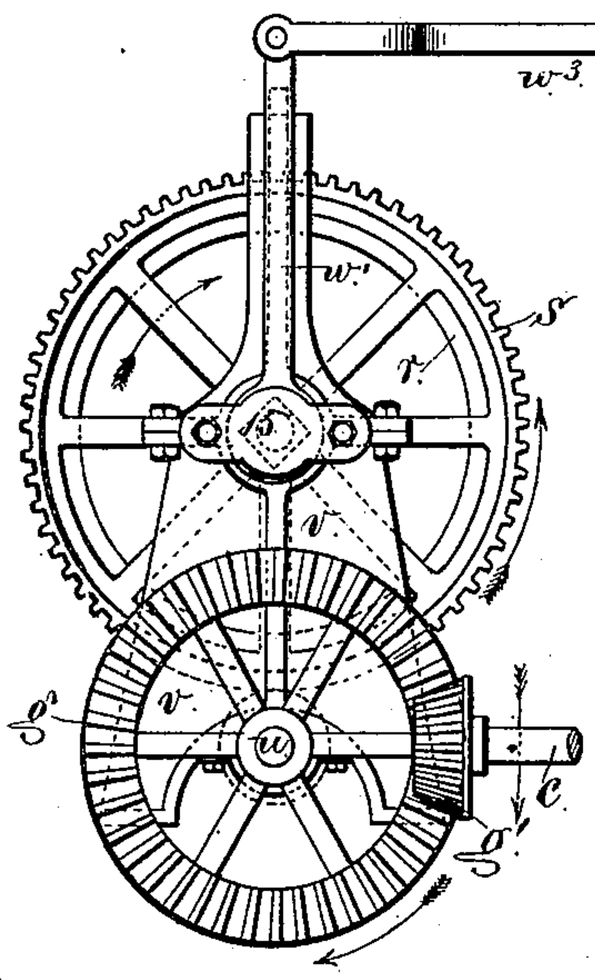
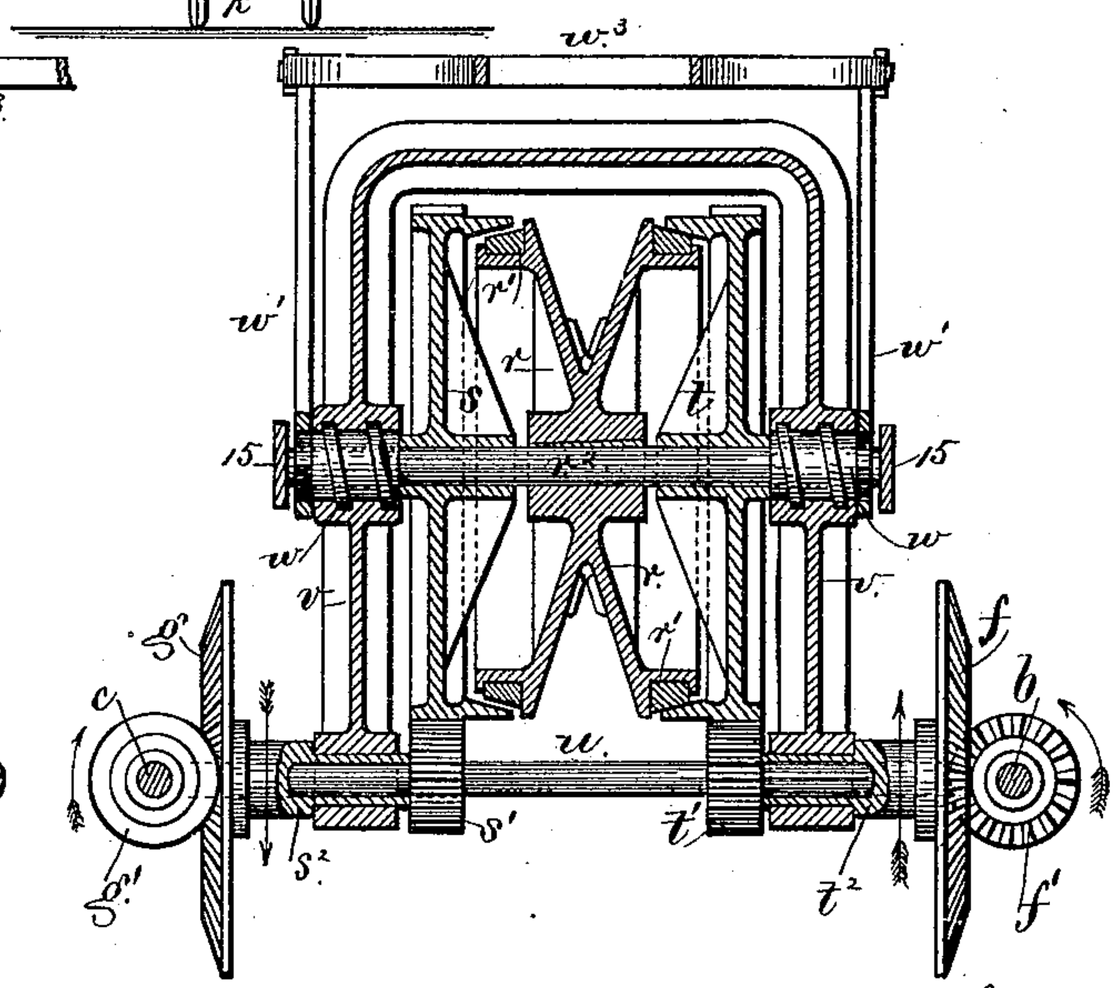


Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS F. LONNEY, OF EAST NEW YORK, N. Y.

SUBMARINE ROCK-BREAKER.

SPECIFICATION forming part of Letters Patent No. 303,392, dated August 12, 1884.

Application filed January 7, 1884. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. LONNEY, of East New York, in the county of Kings and State of New York, have invented a new and useful Improvement in Submarine Rock-Breakers; and the following is declared to be a description of the same.

In the excavation of submarine rock, especially phosphate rock, it has heretofore been difficult to separate or break up the stratified rock into pieces of a proper size for handling and with such rapidity as to be economical, and the breakers and dredgers heretofore employed have failed to accomplish this work satisfactorily.

The object of my invention is to obviate these difficulties and to produce an apparatus that is efficient and economical. I make use of a scow or suitable float and an engine or engines upon the same, and double steel-pronged plow or breaker suspended from the float by rigid arms. Two of these arms act as guides. The two other pairs—one on each side of the guides—operate the pronged plow or breaker and impart to it an up-and-down movement by the action of two pairs of right and left hand screws, which screws are in turn operated by bevel-gear wheels from the shaft of the engine. These arms are clamped in pairs in moving cross-heads, and the right and left hand screws pass through blocks at the ends of these cross-heads, and these screws, when revolved in one direction, separate the cross-heads and elevate the breaker, while the reverse movement brings the cross-heads toward each other and lowers the breaker. I employ a wheel between the breakers and a winding-drum upon the float, and a chain from an anchor, fastened forward of the float passes under the wheel, between the breakers, and up to the winding drum, and said drum is provided with gear-wheels connected by bevel-wheels with the screw-operating shafts, so that it may be revolved continuously in one direction during both the upward and downward movements of the breakers and forcing them into or against the rock.

In the drawings, Figure 1 is a plan of the float and machinery. Fig. 2 is a vertical section of the float and elevation of the breaker at the line *x x*. Fig. 3 is a cross-section at *y y*. Fig. 4 is an elevation, partially in section, and Fig. 5 a side elevation, of the winding apparatus for the chain, shown in larger size.

A is the scow or float, which may be of any desired construction and provided with a central opening or well-hole, and B represents the engine or engines, which preferably are double and of the upright or vertical type, but may be of any known form, and do not require description.

Upon the longitudinal girders *a a'*, I place suitable bearings, 1 2 3 4 5 6 7 8, and these support the right and left hand screws *b b'* and *c c'*, and these screws are connected by bevel-gears *d d'* and *e e'* with the shaft of the engines. The screws *b c* are connected by bevel-gears *f f'* and *g g'* with the shaft *u*, for the friction-drum for hauling on the chain in operating the float hereinafter described.

The plow or breaker consists of the two steel prongs, *h h'*, and these are connected together by the shaft *i*, that is keyed or bolted in place. Upon this shaft *i* is the wheel *i'* for the chain *k;* and I prefer to make this wheel of two parts or halves bolted together and turning in a groove made in the shaft *i*. I also employ a hanger, *k'*, under this wheel *i'*, and this serves the purpose of keeping the chain from getting out of the groove of the wheel *i'*, and also from becoming tangled in shifting the position of the scow.

The tops of the prongs *h h'* are made with flanges, and are secured by bolts to the flanges of the iron shoes or sockets *l l'*, and these sockets hold and have bolted to them the perpendicular guide-arms *m*, and these guide-arms are preferably marked, indicating the depth of the water in feet, and they slide between guides 13 at each side of the central well-hole.

The arms *m'* are secured by bolts 9 10 in sockets l^2, and these in turn are pivoted to the shoes by the bolts 11 12. The arms *m'* pass through the cross-heads *n n'*, and can be raised or lowered or clamped in said cross-heads by serrated plates and screws *o*, and when it is desired to raise or lower the plow or breaker the screws *o* are loosened, the arms *m'* raised or lowered, according to the depth of water, and the screws *o* clamped again.

The blocks *p p'* and cross-heads are screwed backward and forward by the revolution of

the screws *b b'* and *c c'*, and said blocks receive the journals at the ends of the cross-heads *n n'*; hence the cross-head and blocks move together; but the cross-heads can turn with the bars *m' m'* as they are swung open or brought toward each other, by which the toggle-bars are caused to raise or lower the disrupting-plow.

The drum *r* is constructed with a peripheral channel for the chain and with flanges at each side, and these flanges *r'* are beveled, and are preferably of wood fitted into iron trough-shaped receptacles.

The drum *r* is fast upon its axle r^2, and said axle or shaft is supported in bearings in the frame *v*, secured to the timbers of the float or scow A. The shaft *u* is supported in the lower part of this frame *v*, and around it are the pinions *s' t'*, gearing into the wheels *s* and *t*. The toothed wheels *s* and *t* are loose upon the shaft r^2, and the pinions *s' t'* are fast upon sleeves s^2 t^2, that are loose upon the shaft *u*, and the sleeves s^2 t^2 are provided with the bevel-gears *f g* at their outer ends. The wheels *s t* are made with bevel-flanges at one side, to engage frictionally the bevel-flanges *r'* of the drum *r*.

Around the journals of the shaft r^2 are screw-bushings *w* in the frame *v*, and they are connected by yoke-levers *w'* to a joint-rod, w^3, that is connected to the reversing-lever of the engines, or to a lever that is conveniently moved by the engineer. The shaft r^2 is kept in place preferably by caps 15, bolted to the side of the frame *v*, as shown in Figs. 4 and 5. The toothed wheels *s' t'* and sleeves s^2 t^2 are revolved upon the shaft *u* in reverse directions by the bevel-pinions *f' g'* whenever the screws *b c* are being rotated; but as the direction of rotation of the screws is changed according to the up-and-down movement of the breaker, the toothed wheels *s* and *t* will sometimes rotate one way and sometimes the other way, but always in opposite directions to each other. In Fig. 4 the toothed wheel *t* is engaged with one flange, *r'*, and for illustration it may be presumed that the plow or disrupter is descending, and that the chain is being wound upon the drum by the friction-wheel *t*. Now, when the disrupter reaches its full descent, the lever is operated and the engines reversed to cause the breaker to ascend. Simultaneously with the reversal of the engine and the direction of revolution of the screws, the rod w^3 and levers *w'* are to be moved, and with them the screw-bushings *w* are turned, and the end movement of the screw-bushings *w* releases the wheel *t* from *r'* on one side and presses up the wheel *s* against *r'* on the other side, so that the drum *r* is caused to continue its revolution in the same direction and pull upon the chain *k* to drag the disrupting-plow against the rock and cause the rock to be broken by the ascending and descending motion given to the plow.

The chain *k* may continuously be wound on drum *r* or be passed off to the hold in the float.

I claim as my invention—

1. The combination, in a rock-breaker, of a float and engine, the screws *b b' c c'*, cross-heads *n n'*, and clamping-screws *o*, the guide-arms *m*, toggle-arms *m'*, the disrupters or plows *h h'*, the wheel *i'*, chain *k*, and means for drawing in said chain, substantially as set forth.

2. The combination, with the screws *b c* and bevel-wheels *f f'* and *g g'*, of the drum *r*, shaft r^2, friction-flanges *r'*, toothed wheels *s s'* and *t t'*, sleeves s^2 t^2, shaft *u*, screw-bushings *w*, and lever *w'*, substantially as set forth.

3. The guide-arms *m*, toggle-arms *m'*, sockets l^2, and shoes *l l'*, in combination with the disrupters or plows *h h'* and the axle *i*, wheel *i'*, chain *k*, hanger *k'*, and means, substantially as described, for operating the disrupter and chain, respectively, as set forth.

4. The combination of the disrupters *h h'*, the toggle-arms *m'*, connected to the disrupters, the cross-heads and clamping device, and the screws for moving the cross-heads and raising and lowering the disrupters by the toggle-arms *m'*, substantially as set forth.

5. The combination of the disrupters or plows *h h'*, the guide-arms *m*, the toggle-arms *m'*, said arms being pivoted to the disrupters, the cross-heads, and the screws for raising and lowering the disrupters by the toggle-arms, substantially as set forth.

Signed by me this 19th day of December, A. D. 1883.

THOS. F. LONNEY.

Witnesses:

C. D. ASHCROFT,

HENRY D. LESESNE, Jr.