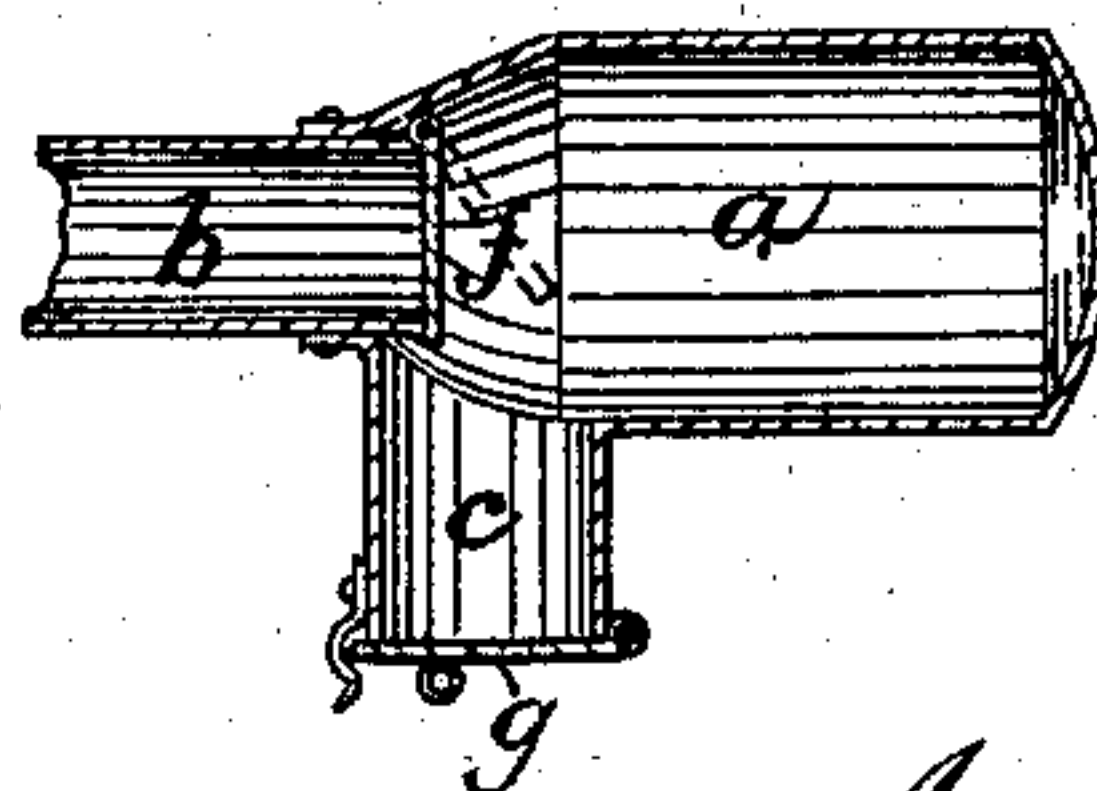
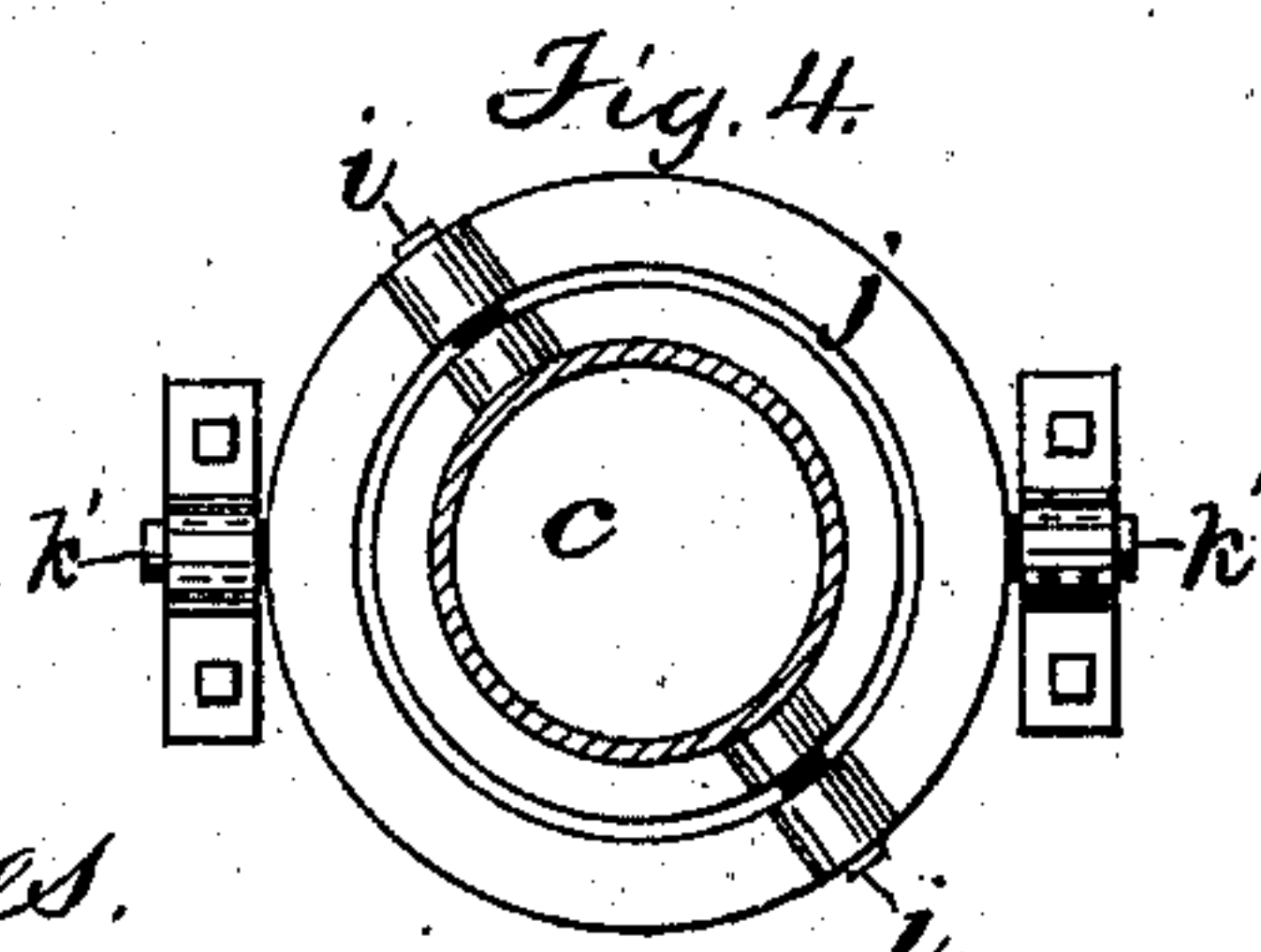
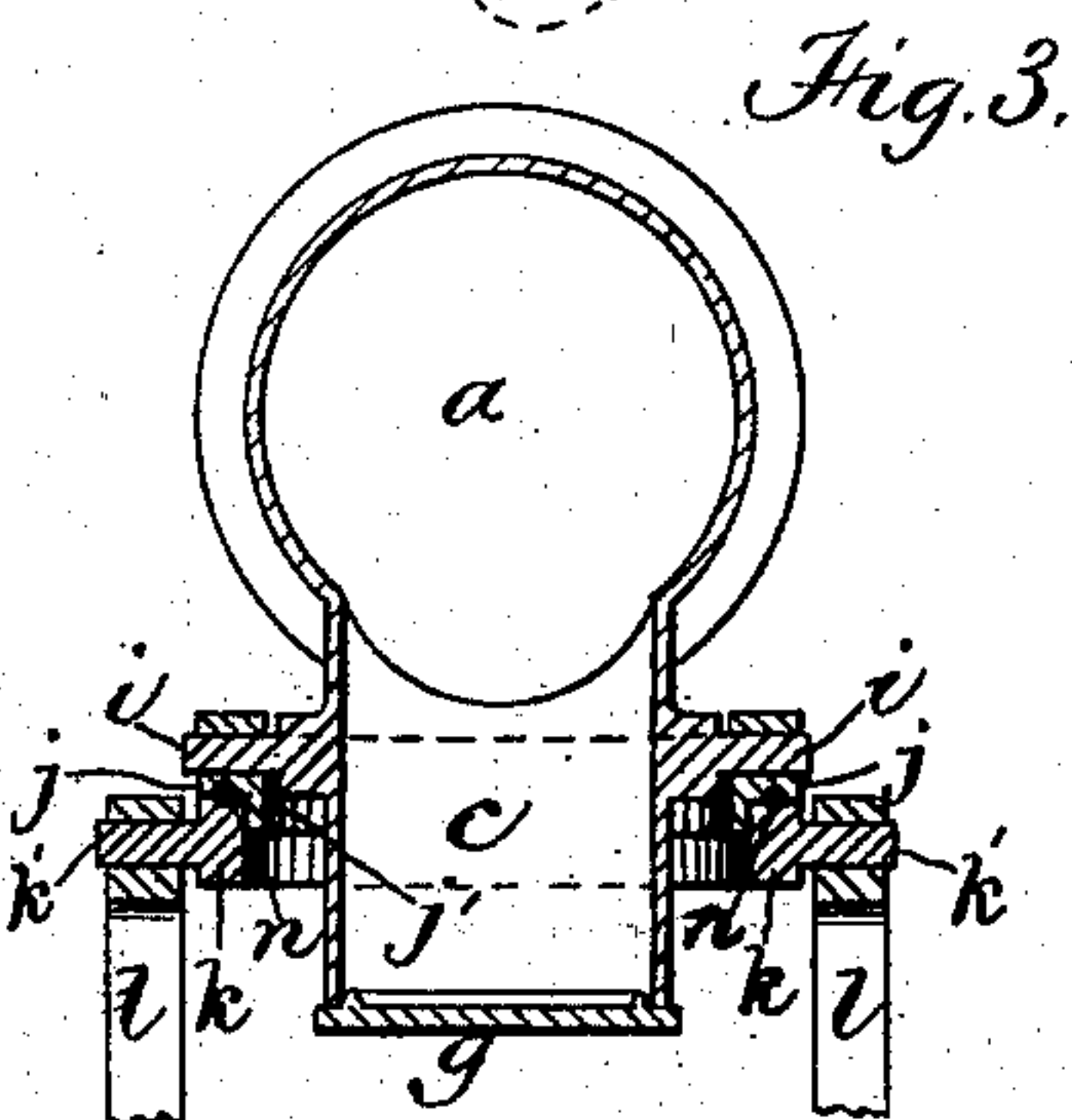
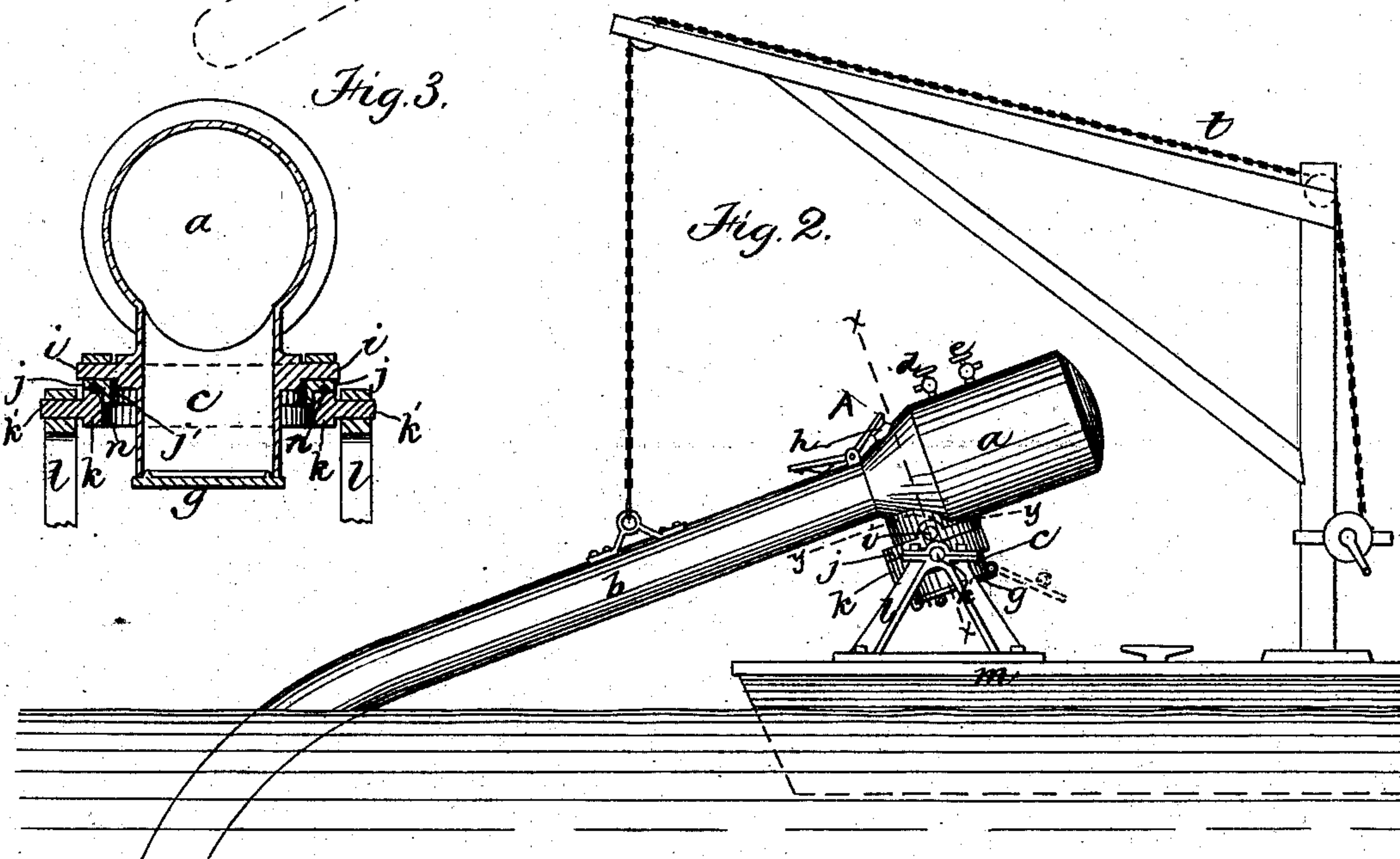
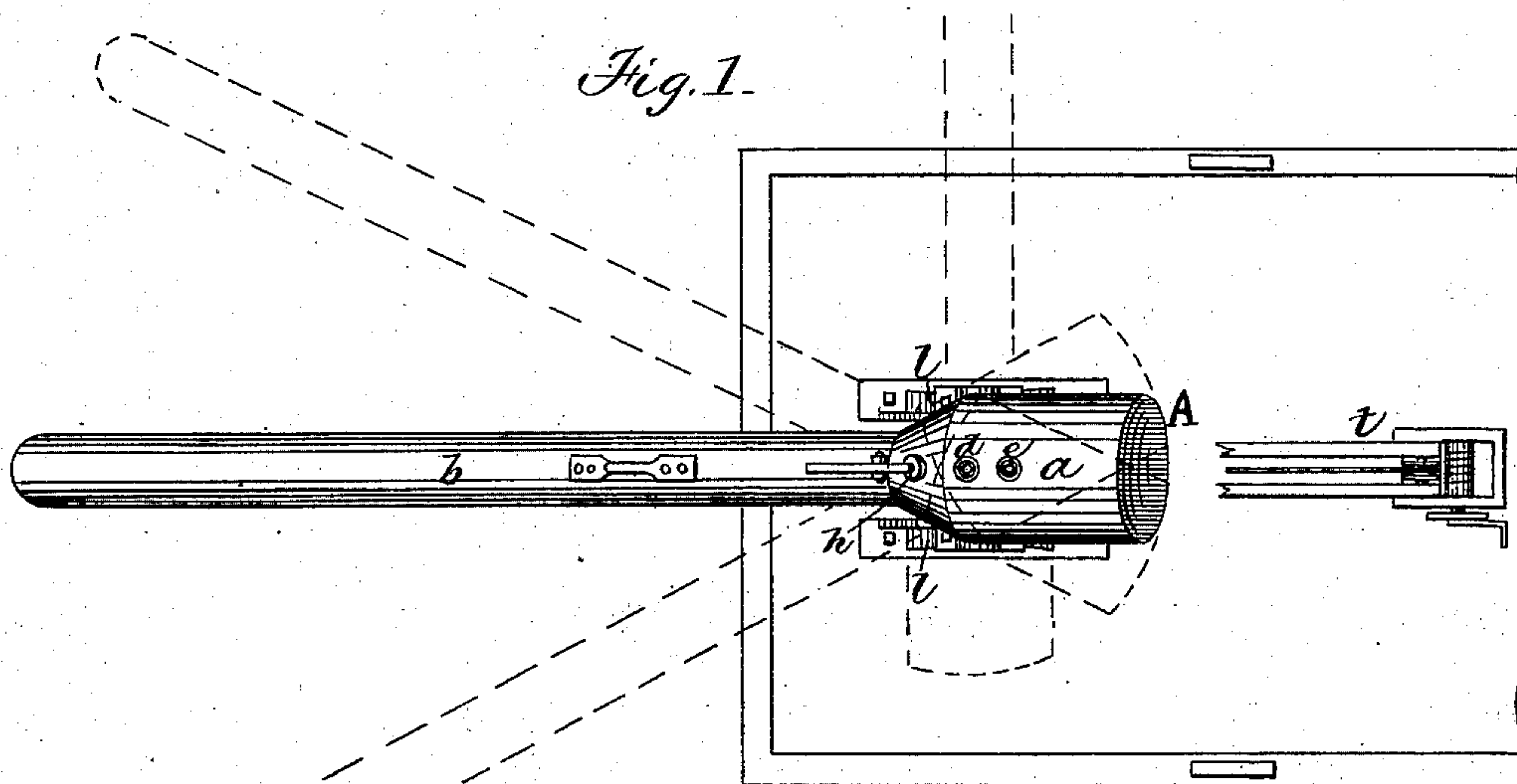


(No Model.)

2 Sheets—Sheet 1.

H. C. SEARS.
Vacuum Dredging Apparatus.
No. 238,975.
Patented March 15, 1881.



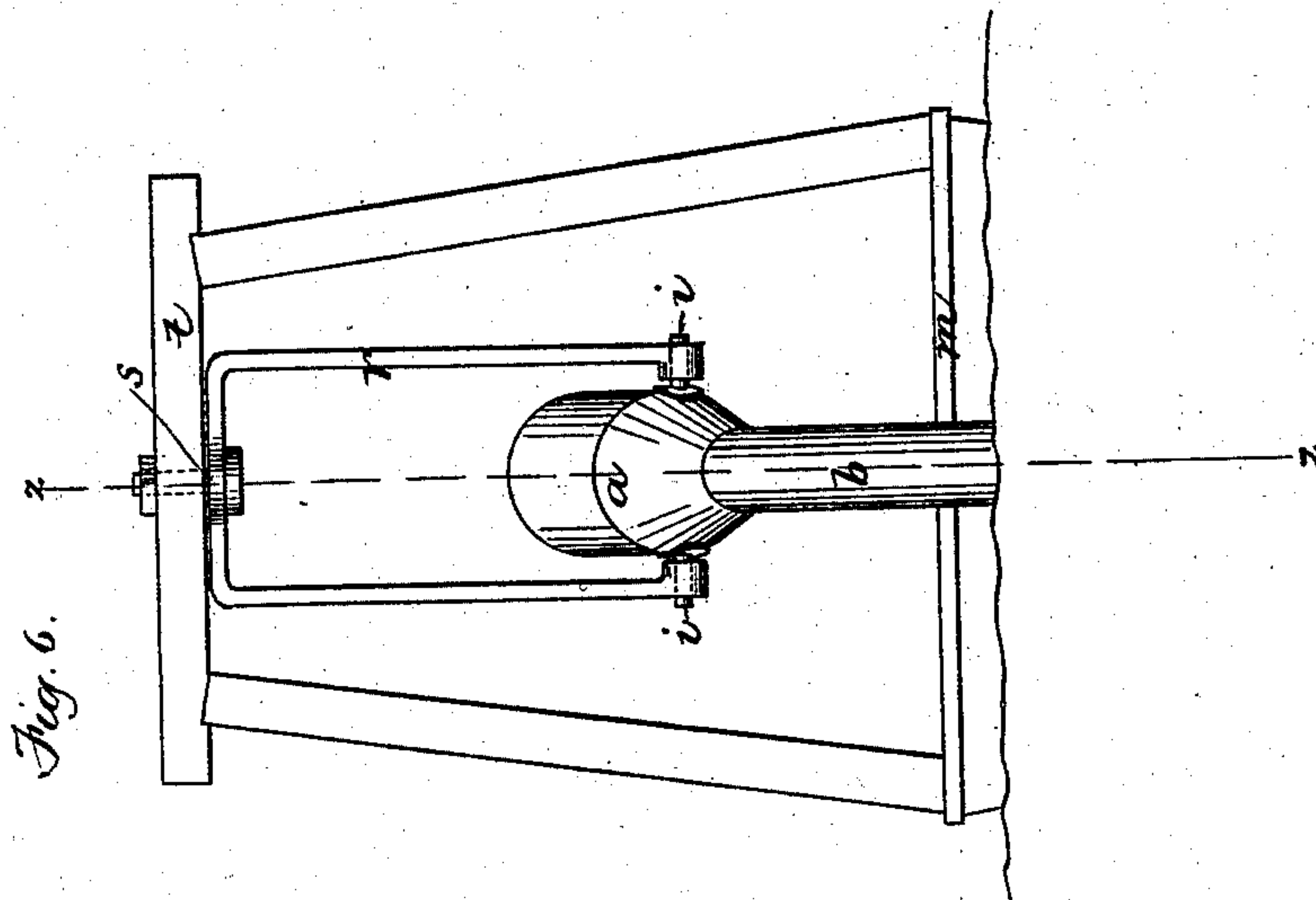
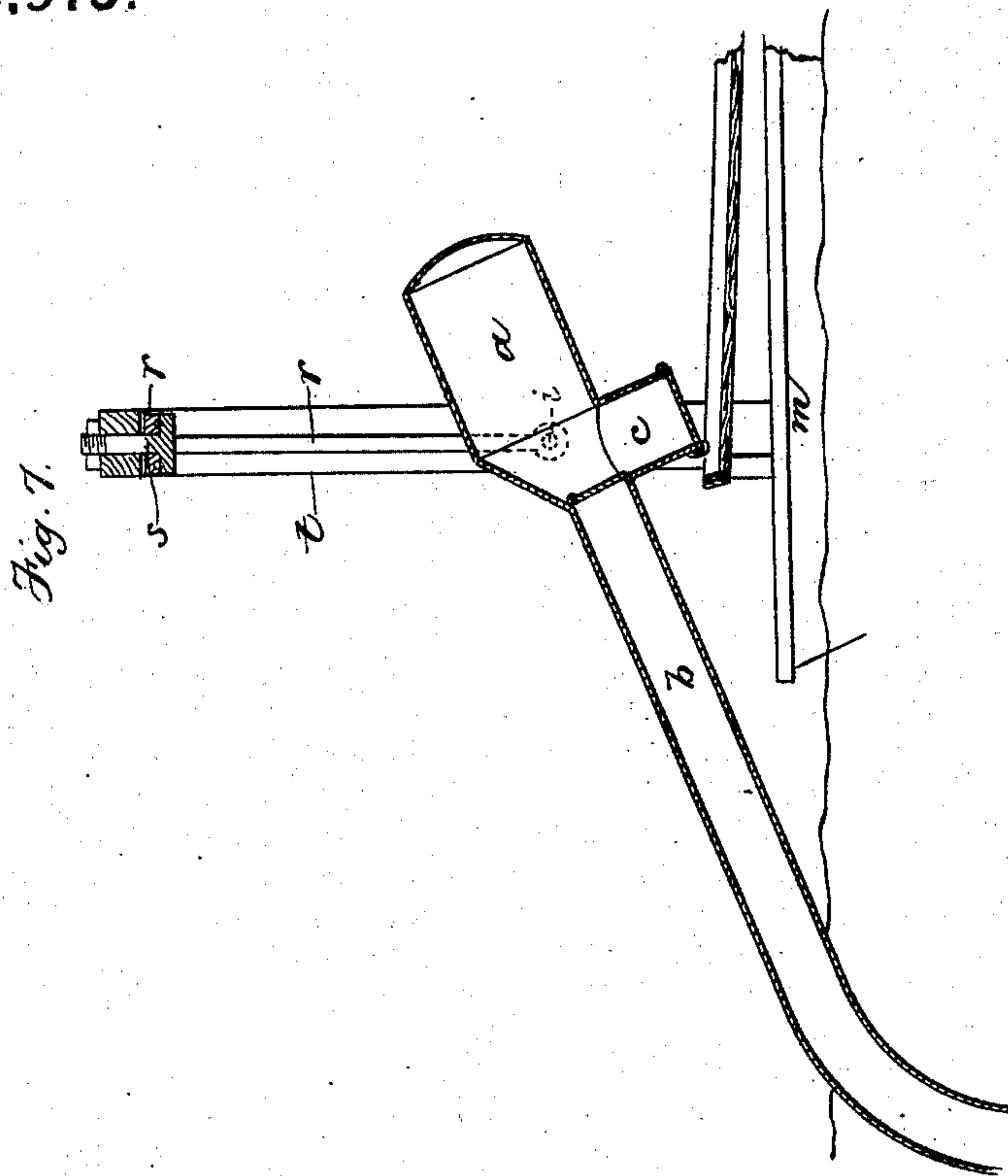
Witnesses.
W. Glimo
Geo. W. Pierce.

Inventor:
H. C. Sears
by Wright & Brown
Attys

(No Model.)

2 Sheets—Sheet 2.

H. C. SEARS.
Vacuum Dredging Apparatus.
No. 238,975. Patented March 15, 1881.



Witnesses.

Geo. W. Pierce
John M. Guohay

Inventor.

H. C. Sears
by Wright & Brown
Attys.

UNITED STATES PATENT OFFICE.

HENRY C. SEARS, OF BOSTON, MASSACHUSETTS.

VACUUM DREDGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 238,975, dated March 15, 1881.

Application filed January 4, 1881. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. SEARS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Vacuum Dredging Apparatus, of which the following is a specification.

This invention relates to that class of vacuum dredging apparatus of which a type is shown in Letters Patent of the United States, granted to me July 13, 1880, said apparatus being composed of a chamber or receiver adapted to receive alternately steam and cold water, and an induction-tube adapted to extend to a submerged surface to be dredged. The apparatus, which is located on a scow or vessel, operates on the well-known principle of the Savary pump—that is to say, steam is introduced into the receiver and then suddenly condensed. A vacuum is thus created, and water, mud, &c., is drawn into the receiver from the submerged surface through the induction-pipe by atmospheric pressure, the matter so drawn being subsequently discharged from the receiver through a separate opening.

In my above-mentioned patent I have shown the dredging apparatus or "Savary pump" (for so I propose to term the apparatus for convenience of description) provided with trunnions and adapted to swing vertically, so that the pump could assume any desired angle of inclination, thereby adapting the pump to the inequalities of the submerged surfaces on which it operates.

My present invention has for its object to enable the pump to swing horizontally on its support as well as vertically, and thereby enable it to dredge a large area of submerged surface without moving the scow or vessel on which the pump is located. To this end my invention consists in the provision of means whereby the pump is enabled to swing horizontally independently of its support; and also in certain improvements in the construction of the pump, all of which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a top view of an apparatus embodying my invention. Fig. 2 represents a side view of the same. Fig. 3 represents a section on line *x x*, Fig. 1. Fig. 4 represents a section on line *y*

y, Fig. 2. Fig. 5 represents a longitudinal central section of the receiver of the Savary pump. Fig. 6 represents an end view of a scow having a modification of my invention; and Fig. 7 represents a section on line *z z*, Fig. 6.

The same letters of reference indicate the same parts in all the figures.

In Sheet 1 of the drawings I have shown the best method of carrying out my invention of which I am aware, and I will first describe the construction shown on said sheet.

In the drawings, A represents the Savary pump, composed of a receiver, *a*, an induction-tube, *b*, arranged substantially in line with the receiver and curved downwardly at its lower end, and a lateral discharge-pipe, *c*, arranged substantially at right angles to the receiver, and extending downwardly from the lower portion thereof, as shown in Fig. 2, said parts being made of steel plates strongly riveted. The receiver is provided with cocks or couplings *d e* for the connection of pipes to supply steam and cold water to the receiver. The induction-pipe is provided with a valve or gate, *f*, which is opened by the matter passing up into the receiver, and closes automatically when said matter is being discharged, thus preventing the matter from passing down the induction-pipe. The discharge-pipe is provided with a tightly-fitting door, *g*, at its lower end.

h represents an air-valve to admit air to the receiver, and facilitates the discharge of its contents. The pump is provided with trunnions *i i*, attached to opposite ends of the discharge-pipe, and these trunnions are fitted in bearings, so that the pump can swing or oscillate vertically, as in my above-named patent. To enable the pump to swing horizontally I fit the trunnions *i i* in bearings in an annular frame, *j*, and this frame is supported and adapted to rotate on an annular track, *k*, having trunnions *k' k'* fitted in bearings in suitable standards or supports *l*, which are bolted to the scow *m*. The trunnions *k'* enable the track *k* to be inclined with the pump, so that it will not interfere with the vertical swinging movement of the pump, as it would be liable to do if it were rigidly attached to the standards *l*. I do not limit myself, however, to the use of the trunnions *k'*, as the track *k* may

be rigidly fixed in a horizontal position, if desired. The frame *j* is preferably provided with a flange, *j'*, which prevents lateral displacement of the frame on the track *k*. Friction
5 rolls or balls *n* may be interposed between the frame *j* and track *k*.

It will be seen that by the described construction the pump not only has a free vertical swinging motion, but is also adapted to be
10 swung horizontally and assume various positions, as shown in dotted lines in Fig. 1, so that it is enabled to operate successively at different points on the submerged surface without moving the scow.

15 To move the pump horizontally and vertically, as desired, I provide the scow with a suitable swinging derrick or derrick-crane of any suitable construction, so that the pump can be easily changed from one position to another to vary either its inclination or its horizontal position.

I prefer to provide the track *k* with suitable marks or graduations, and the frame *j* with a pointer to indicate the distance traversed by
25 the outer end of the induction-pipe when the pump is swung horizontally.

In case the pump is turned horizontally until its trunnions *i i* are at right angles with the trunnions *k' k'* of the track *k*, it will be
30 necessary to brace or support the track in a horizontal position by any suitable means, otherwise the track would be liable to tip, thus causing the pump to fall to one side or the other.

35 In the modification shown in Sheet 2 the receiver *a* is provided with trunnions *i i*, which are journaled in the ends of a bail, *r*, and said bail is pivoted at *s* in a frame, *t*, so as to turn horizontally. This construction permits the
40 pump to have the same movements as the construction previously described, excepting that the horizontal movements are more limited in consequence of the frame *t*.

I claim—

1. A vacuum dredging apparatus or Savary 45 pump of the class herein described, adapted to swing both vertically and horizontally on a scow or other support by means substantially as and for the purpose set forth.

2. The improved vacuum dredging appa- 50 ratus or Savary pump, composed of the receiver *a*, the induction-pipe *b*, and the lateral discharge-pipe *c*, having trunnions *i i*, combined with the frame *j*, adapted to rotate horizontally, and provided with bearings for the 55 trunnions *i i*, as set forth.

3. The combination, in a vacuum dredging apparatus, of a scow or vessel having the annular track or support *k*, the annular frame *j*, adapted to rotate on said track, and the 60 Savary pump *A*, having trunnions *i i*, fitted in said bearings in said frame, as set forth.

4. The improved Savary pump herein described, composed of the receiver *a*, adapted to receive steam and water, the lateral dis- 65 charge-pipe *c*, arranged substantially at right angles to the receiver and pivoted to a suitable support, as described, and the induction-pipe *b*, substantially in line with the receiver and provided with a self-closing valve, *f*, 70 whereby the escape of the contents of the receiver through the induction-pipe is prevented, as set forth.

5. The combination of a scow or vessel, a Savary pump adapted to swing both vertically 75 and horizontally thereon, by means substantially as described, and a derrick-crane for swinging said pump in either of said directions, as set forth.

In testimony whereof I have signed my name 80 to this specification in the presence of two subscribing witnesses.

HENRY C. SEARS.

Witnesses:

C. F. BROWN,
GEO. W. PIERCE.