

No. 776,051.

PATENTED NOV. 29, 1904.

O. FRÜHLING.

ADJUSTABLE DREDGER HEAD FOR SUCTION DREDGES.

NO MODEL.

APPLICATION FILED MAR. 9, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

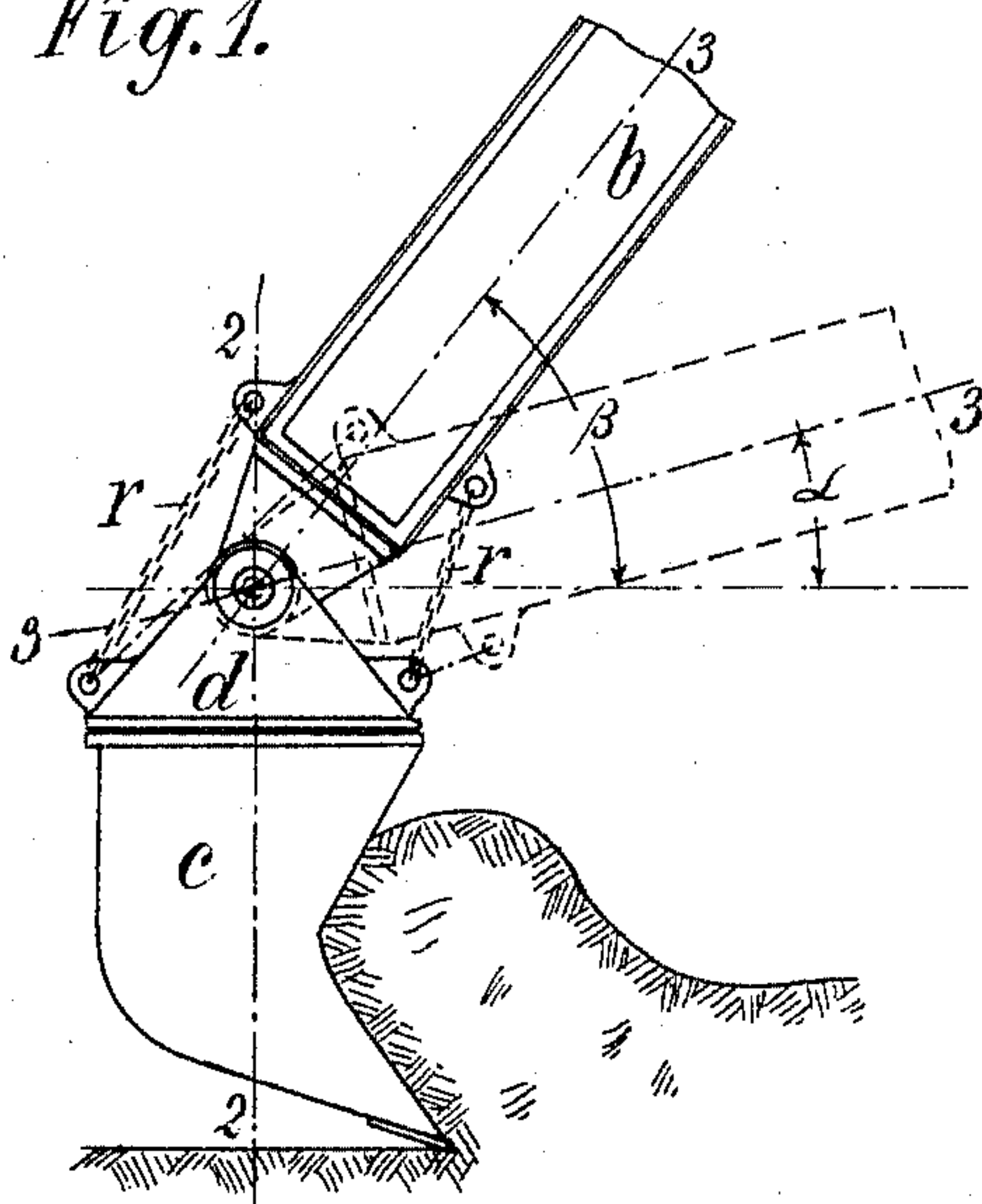


Fig. 2.

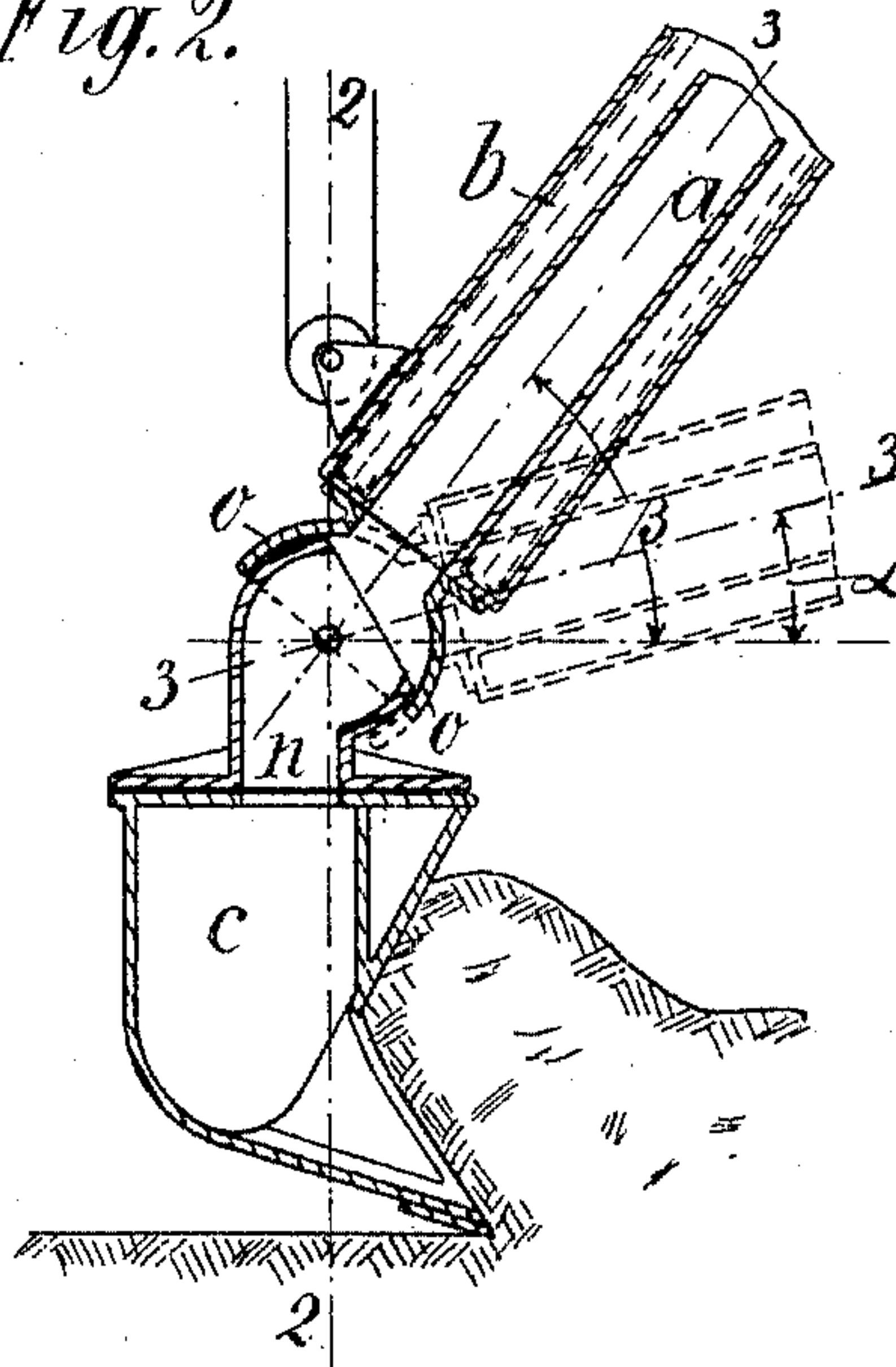


Fig. 3.

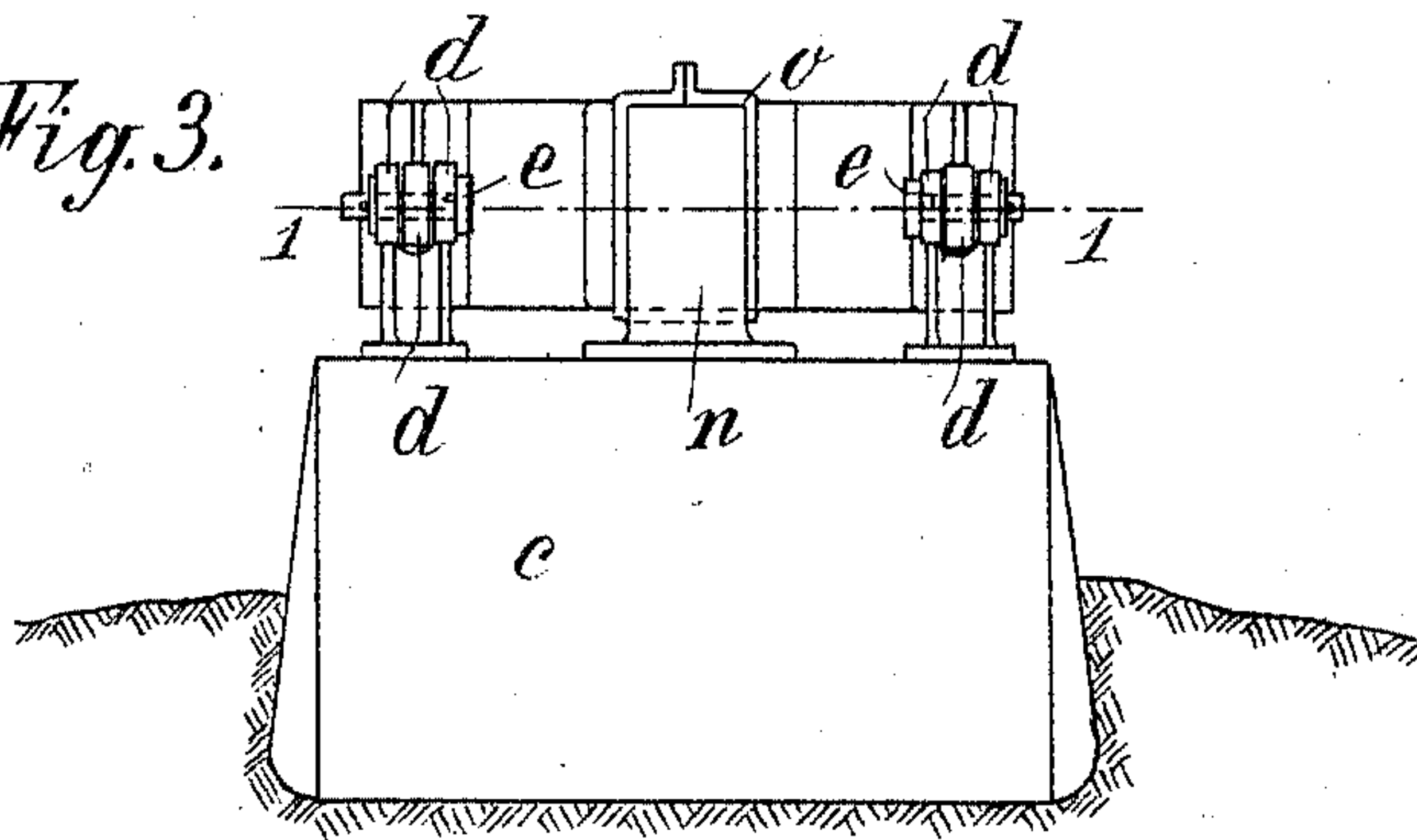
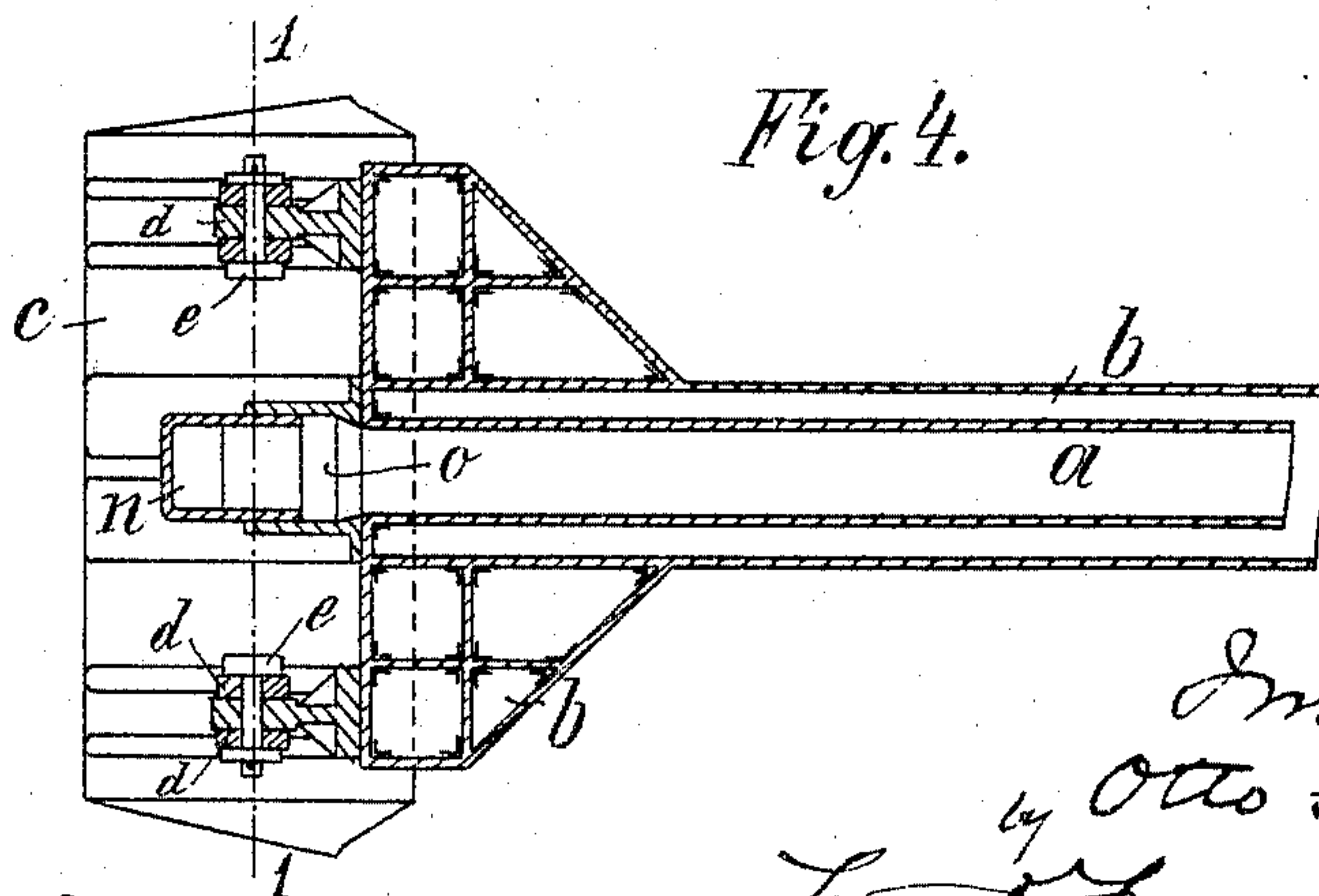


Fig. 4.



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3 SHEETS—SHEET 2.

Fig. 5.

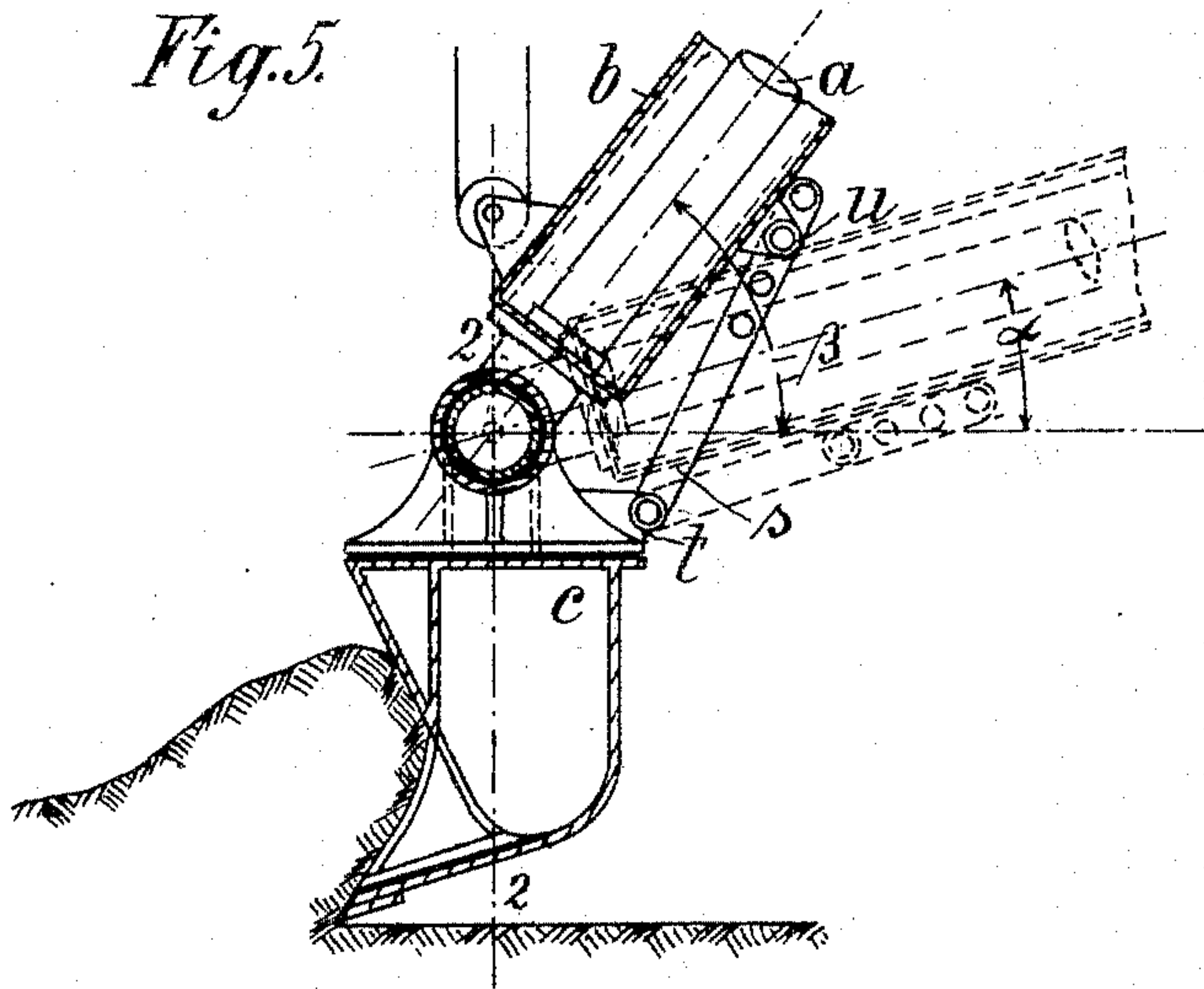


Fig. 6.

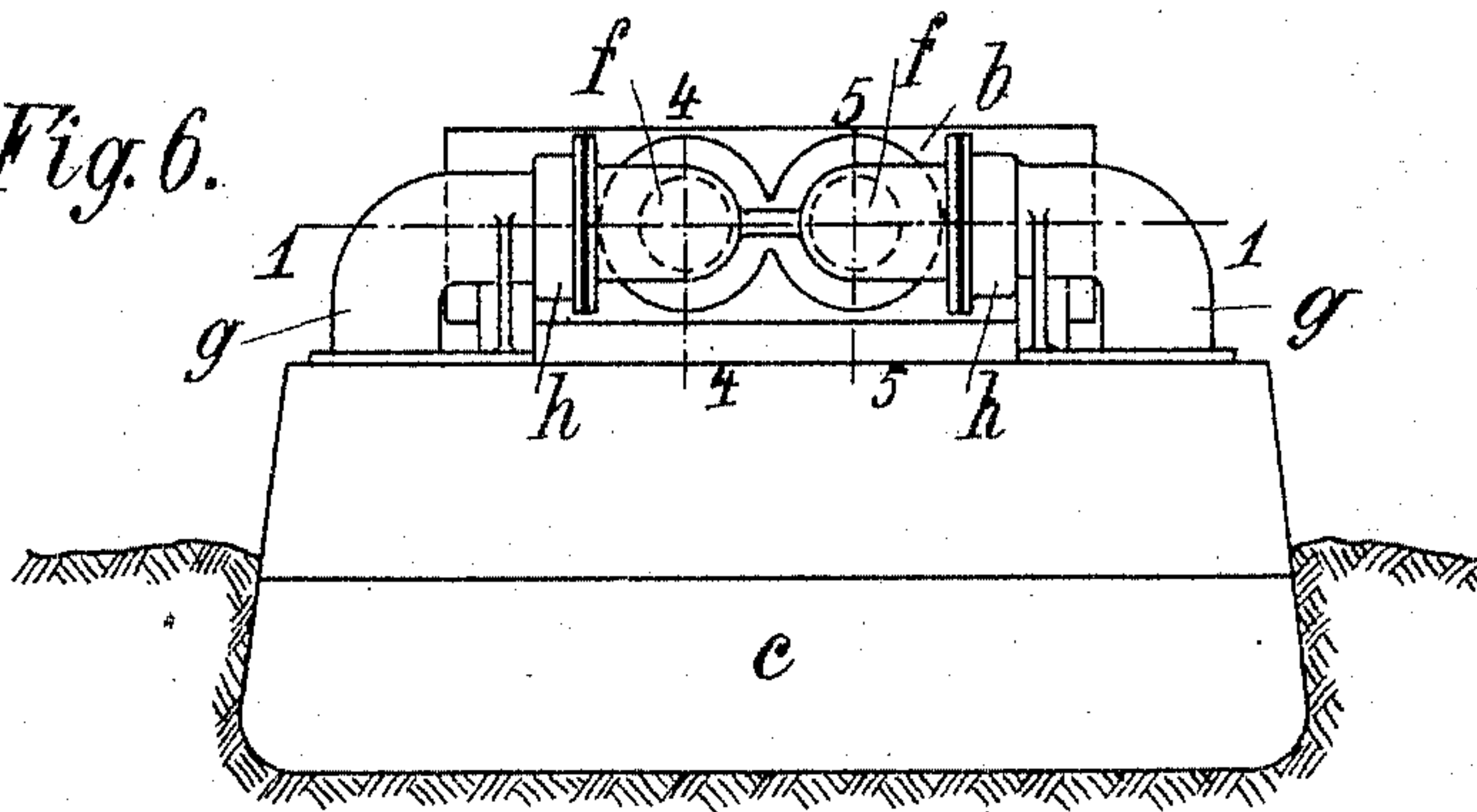
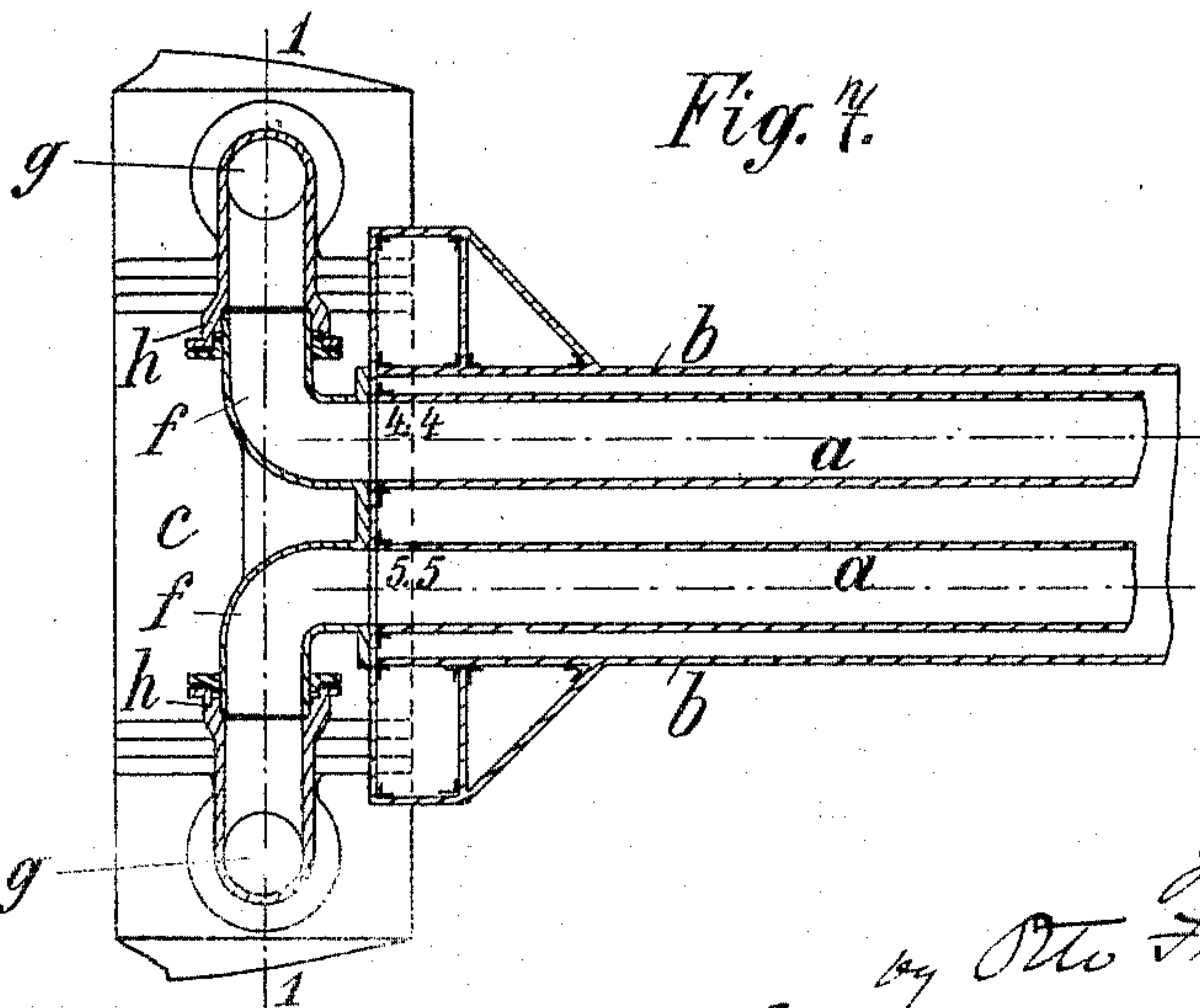


Fig. 7.



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3 SHEETS—SHEET 3.

Fig. 8.

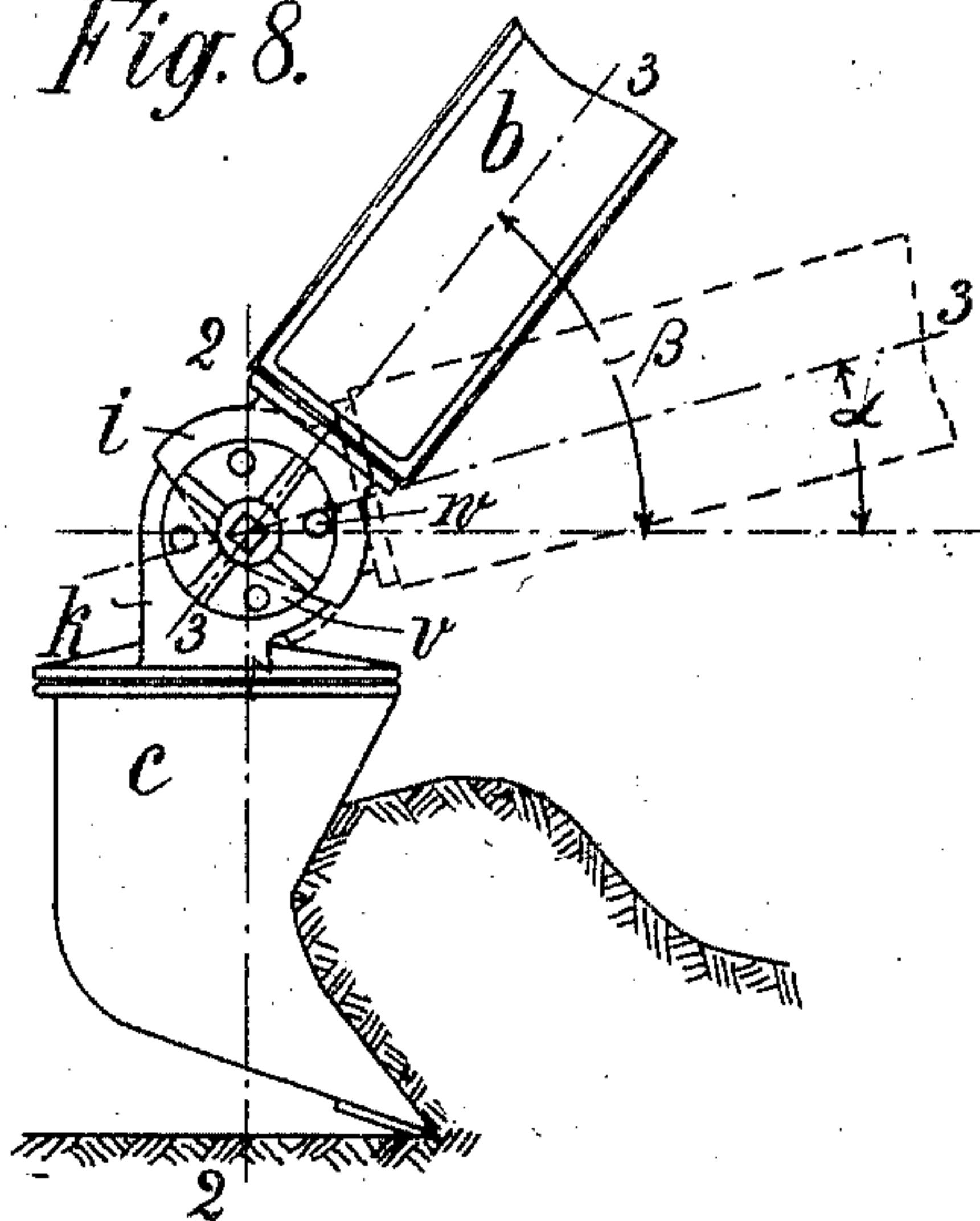


Fig. 9.

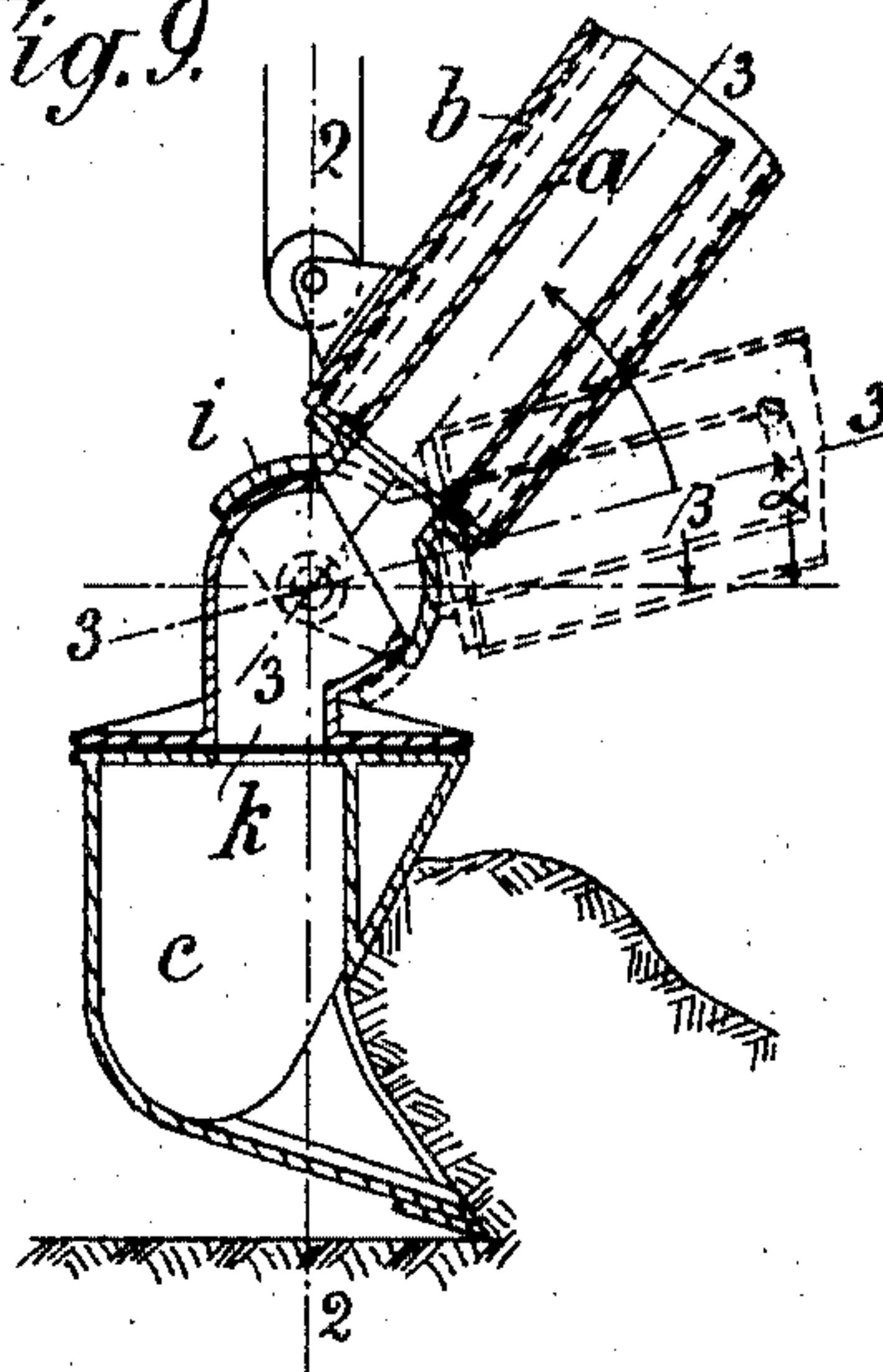


Fig. 10.

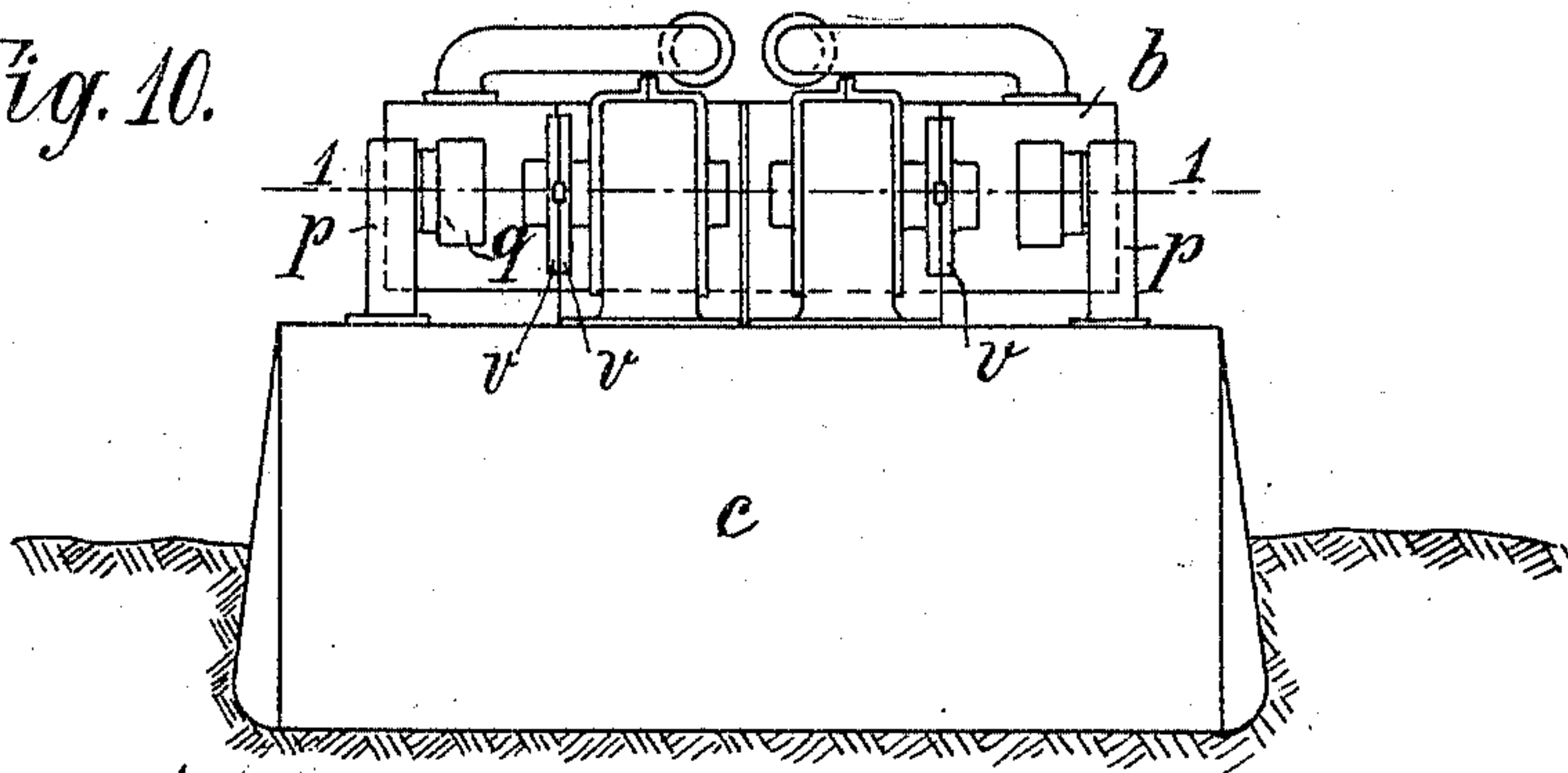
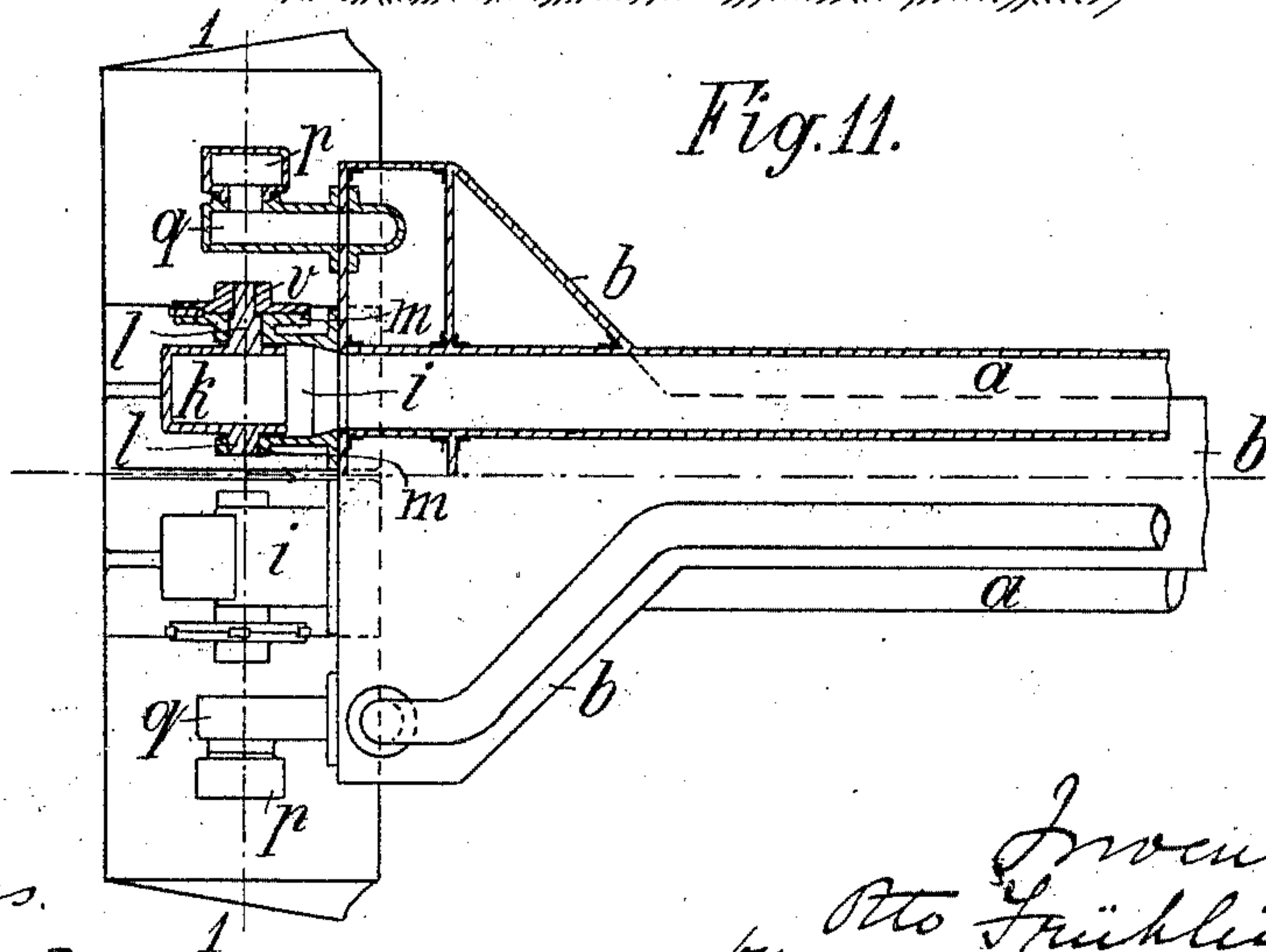


Fig. 11.



Witnesses.

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UNITED STATES PATENT OFFICE.

OTTO FRÜHLING, OF BRUNSWICK, GERMANY.

ADJUSTABLE DREDGER-HEAD FOR SUCTION-DREDGES.

SPECIFICATION forming part of Letters Patent No. 776,051, dated November 29, 1904.

Application filed March 9, 1904. Serial No. 197,276. (No model.)

To all whom it may concern:

Be it known that I, OTTO FRÜHLING, civil engineer, and a subject of the Duke of Brunswick, residing at 5 Monumentsplatz, in the city of Brunswick, in the German Empire, have invented a certain new and useful Adjustable Dredger-Head for Suction-Dredgers, of which the following is a specification.

The invention is especially intended to provide means for improving the mode of operation of that kind of suction-dredgers the suction-conduit of which is provided at its end with special dredger heads or nozzles, so as to increase thereby the efficiency of this kind of dredging-machines.

The novel and essential feature of my invention, by means of which the improvement in the mode of operation of the said dredging-machine is effected, is presented by the fact that the adjustability peculiar to the dredging-head as constructed according to my invention affords the possibility of giving to the dredging-head such a suitable position relatively to the soil to be dug out that the most favorable results are obtained, according to the construction and mode of operation of the same.

As with every kind of working device, the amount of the efficiency in a dredging-head depends upon the manipulation of the same—that is to say, the efficiency of the dredging-head depends on the manner in which the soil to be operated upon is seized by the said head. For a favorable action the most essential point, however, is that of directing the cutting devices of the head toward the soil in the most efficient manner and the fact of keeping the opening of the dredging-head in that position in which it will be best capable of taking up and of seizing the soil in the most perfect manner. This requirement, which is of prime importance for the construction of a good dredging-head, is not taken into account at all in the dredging-heads as heretofore employed, or only in a very imperfect manner. Heretofore the dredging-head has been connected with the suction-conduit either rigidly or so as to be movable to a very small extent only. Hence for that kind of dredging-machines there is but one inclination of

the suction-conduit in which the dredging-head occupies the actually most favorable position in relation to the work—that is to say, in the old kind of dredging-machines the head works satisfactorily for one single dredging depth only, while for all other depths the head does not occupy the correct position and works unsatisfactorily. This very serious drawback is done away with in the present invention.

The essential feature of the said invention resides in the fact that the dredging-head is no longer rigidly connected with the suction-conduit or with its support, as heretofore, but that it is adjustably connected thereto. The adjustable connection may of course be of various forms; but the most serviceable connection will be that in which the head is capable of oscillation around an axis at the end of the suction-conduit or its support.

In Figs. 1 to 4 of the accompanying drawings the new dredging-head is shown in a general form of construction in side view and vertical section and in back view and plan view, respectively. Figs. 5 to 7 and 8 to 11 show some modified arrangements in corresponding views.

a is the suction-conduit of the dredging-machine.

b is the support for the conduit.

c is the movable or adjustable dredging-head, which is suspended in the plane of the axis 1 1, Figs. 2 to 4, in such a manner that its inclination 2 2 in relation to the axis 3 3 of the suction-conduit may be varied in any suitable manner. The manner of suspending the adjustable dredging-head is governed, in the first place, by the construction of the head itself and may therefore be effected in different ways.

As illustrated in Figs. 1 to 4, both the supports *b* for the conduit, as well as the head *c*, are provided with centrally-perforated ears, which are pivotally connected by a connecting-bolt *e*, common to all of them, so that the head is capable of oscillating about the rotating axis 1 1 of the bolt.

In the arrangement represented in Figs. 5 to 7 of the drawings with two conduits the pipe connections on the dredging-head are so

shaped as to constitute the axes of rotation in themselves. The conduits *a a* are curved or deflected laterally adjacent the dredger-head from the axes 4 4, 5 5 of their main sections, so as to merge into the curved or elbow pieces *f f*, lying in the axis 1 1 of rotation of the head, and they are then preferably connected by means of stuffing-boxes *h* to the upper ends of the curved pipes *g g*, which are rigidly connected to the top of the dredging-head, so that the dredging-head *c*, with these curved pipes or elbows *g*, is capable of oscillating around the suction-conduit supports *f* in the plane of the axis 1 1.

Without desiring to limit the possibilities of a practical means of connection between the suctional conduit and the dredging-head the arrangement shown in Figs. 8 to 11 may be given as another fundamental example for the manner of producing this kind of movable connection. The suctional conduits in this modification pass through sleeves *i* and as far as up to the connecting pipe projections *k*, mounted upon the dredging-head. The said pipe projections *k* are provided with lateral projecting lugs *l*, which are surrounded by the projections *m* of the short pipes or sleeves *i*, serving as housings for the journals.

In order to be able to turn the dredging-head immediately at any time, all the pipe-conduits which pass from the suctional conduit to the dredging-head, and consequently also the conduits for pressure-water and for the mixing-water, are provided with movable intermediate pieces or with such other suitably-formed connecting-pieces as to be capable of following always the movements of the head. In the arrangement according to Figs. 1 to 4 these intermediate pieces are represented by the cylindrical parts *n* and *o*, which are readily movable within each other, as shown in Figs. 2 to 4 of the drawings. In the modification shown in Figs. 5 to 7 the elbow-pieces *f*, which are tightened at the stuffing-boxes of the elbow-pieces *g*, serve at the same time as intermediate pieces, and in the third modification the pipe connections *i* and *k* serve in an analogous manner for producing the rotatable connection. Then, it is here also shown, Figs. 10 and 11, in what manner the movable connection of the mixing-tube or of the compressed-air conduit with the dredging-head has to be effected by means of the hinged pipe *p* and *q*. It is evident, however, that movable tubes or hose, ball-joints, and the like may also be used as movable intermediate pieces between the parts of the conduit and the dredging-head. For the purpose of retaining the dredging-head in position during the operation other adjustable and rigid connecting-pieces between the movable dredging-head and the suctional conduit have to be provided, or locking and securing means should be provided for which admit of being readily and conveniently disengaged

from each other and which can be displaced in relation to each other and which also admit of rigid connection. In the arrangement shown in Fig. 1 chains *r* are provided for this purpose. As another example, a rigid connecting-rod *s* is shown in Fig. 5, which connecting-rod is linked to one of the parts to be connected—at *t*, for instance—so as to be only rotatable, while the other part is adjusted in any suitable manner at *u* in relation to the second part. Then, in Figs. 8, 10, and 11 it is shown that an adjustable connection between the two parts may also be effected by means of perforated or toothed disks *v*, one section of which is rigidly connected with parts of the dredging-head, while the other section of the same is rigidly connected to parts of the suctional conduit, the sections being connected by bolts *w*, inserted into corresponding holes of the disks or by inserted wedges.

The mode of operation when a dredger of the construction described is made use of is as follows: The positions of the suctional conduits shown in full and dotted lines in the drawings indicate, respectively, the manner of changing the inclination 2 2 of the dredging-head in relation to the axis 3 3 of the suctional conduit. In case of the dredging being effected at low depths the suctional conduit is lowered but little. It is lying flat and the angle α , formed by the axis of the suctional conduit with the horizontal plane, is small. (See dotted positions.) As the depth of the dredging operations increases the suction-conduit is lowered proportionately farther down, and the dredger is becoming more inclined, as shown by the increasing angle β in the positions shown in full lines; but I am enabled in my invention to impart to the dredger-head on account of its adjustability the most favorable inclination 2 2 for the operation of the machine and relatively to the soil to be dug out and for any depth desired, this being accomplished by a corresponding adjustment with relation to the axis 1 1. If the dredging-head has been adjusted for a certain depth of dredging, so that its inclination is most favorable for producing a great efficiency, it is necessary to retain the dredger in this inclination for such length of time as it is desired to operate it in this depth for the purpose of most efficient working. This is effected by a corresponding adjustment of the retaining device already described and arranged between the head and the support or the conduit, respectively. By this means I am enabled to stop the free movement of the head temporarily and to fix the head in a certain inclined position during any length of time desired.

In Figs. 1 and 8, respectively, I have shown in what manner the dredging-head is moved forward during the operation in the direction of the suctional conduit toward the soil it is desired to dig out. In Fig. 5, however, I have

also illustrated an example of directing the opening of the head instead of in the direction of the suctional conduit in a direction where it is turned away therefrom, which is effected
 5 by turning the head by a corresponding arrangement of the connecting-pipes between the head and the conduit. The first position imparted to the head is to operate it with the head dragging behind, while the second position
 10 is that where the dredger is to work with the head pushed forward. When so operating, the peculiar properties described heretofore of the adjustable dredging-head remain otherwise the same and are not changed by
 15 this adjustment.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a dredging apparatus, the combination with a suction-conduit, of a dredging-head adj-
 20 justably connected with the conduit to permit the relation of the conduit to the head to be varied.

2. In a dredging apparatus, the combination with a suction-conduit, of a dredging-head adj-
 25 justably connected with the conduit to permit the relation of the conduit to the head to be varied, and means for securing the head in the desired position relative to the conduit.

3. In a dredging apparatus, the combination
 30 with a suction-conduit, of a dredging-head ad-

justably connected with the conduit to move about an axis extending transversely of the conduit.

4. In a dredging apparatus, the combination with a suction-conduit, of a dredging-head ad- 35
 justably connected with the conduit to move about an axis extending transversely of the conduit, and means for securing the head in the desired position relative to the conduit.

5. In a dredging apparatus, the combination 40
 with a dredging-head, of a sectional suction-conduit having one section connected to said head and adapted to be adjusted relative to the adjacent section, to vary the relation of the head to the conduit.

6. In a dredging apparatus, the combination 45
 with a dredging-head, of a suction-conduit communicating with said head and provided adjacent said head with laterally-projecting trunnions, and means connecting said trun- 50
 nions and the head, whereby the latter can be adjusted to vary the inclination of the conduit thereto.

In witness whereof I have hereunto signed my name in the presence of two subscribing 55
 witnesses.

OTTO FRÜHLING.

Witnesses:

WOLDEMAR HAUPT,
 HENRY HASPER.