

No. 612,458.

Patented Oct. 18, 1898.

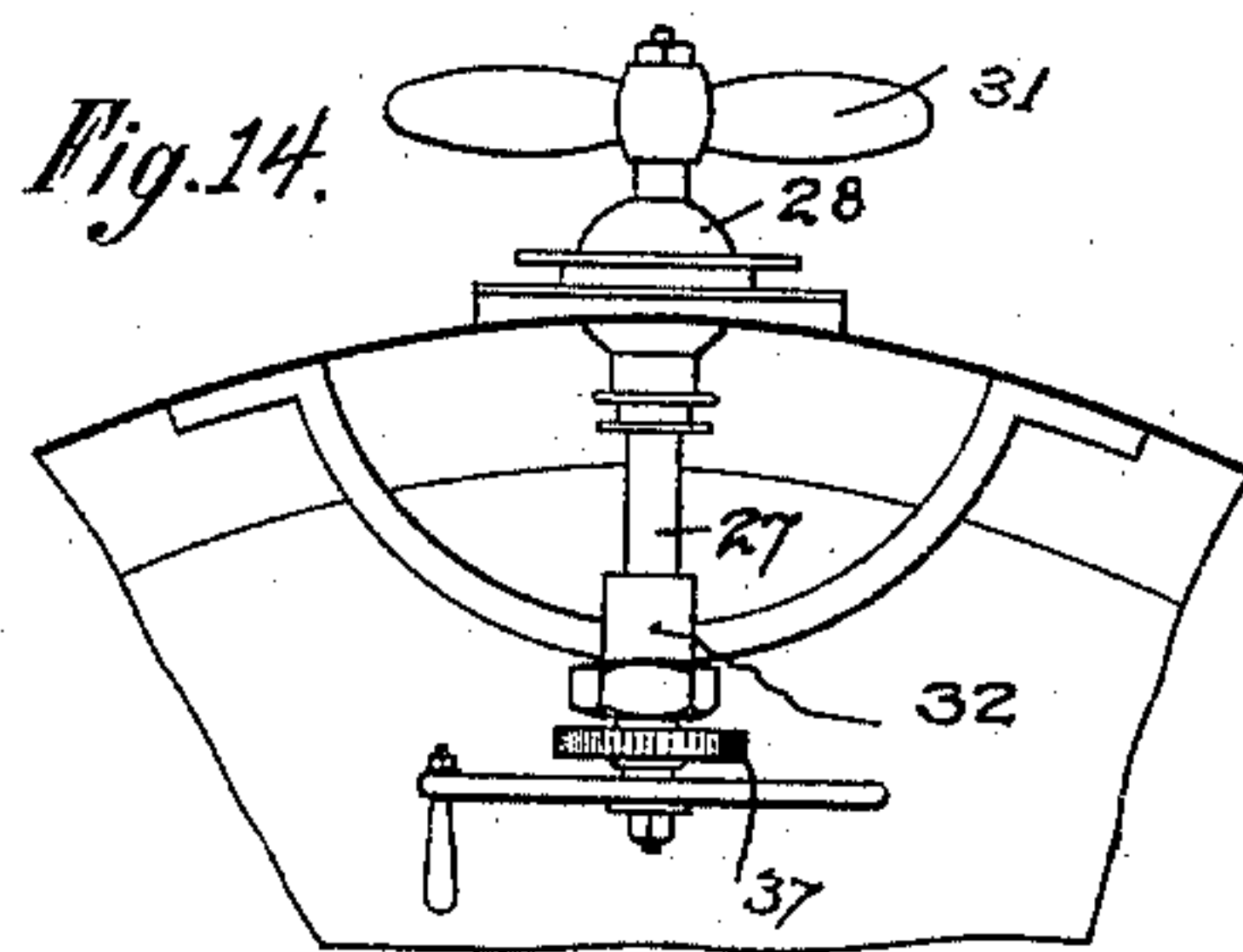
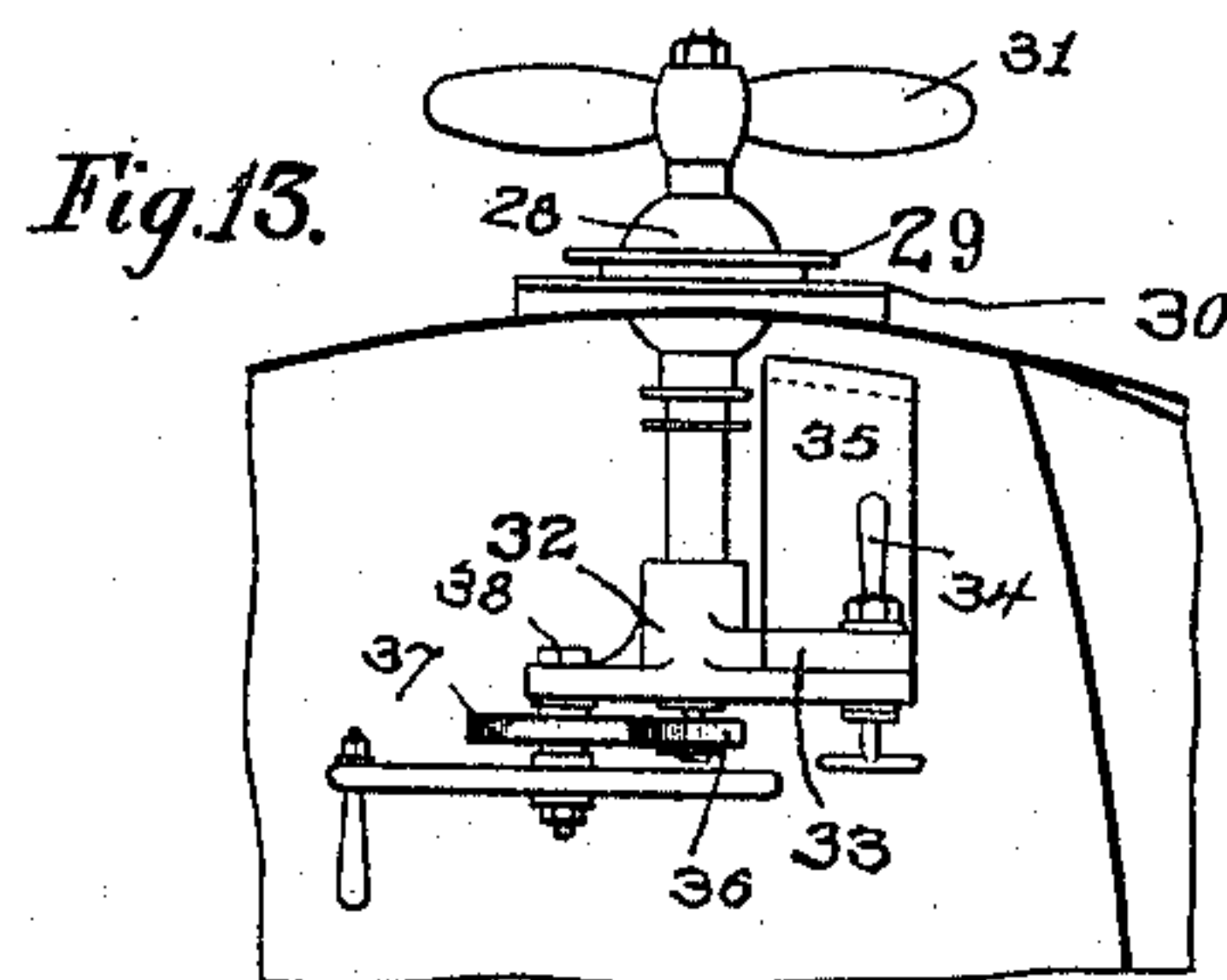
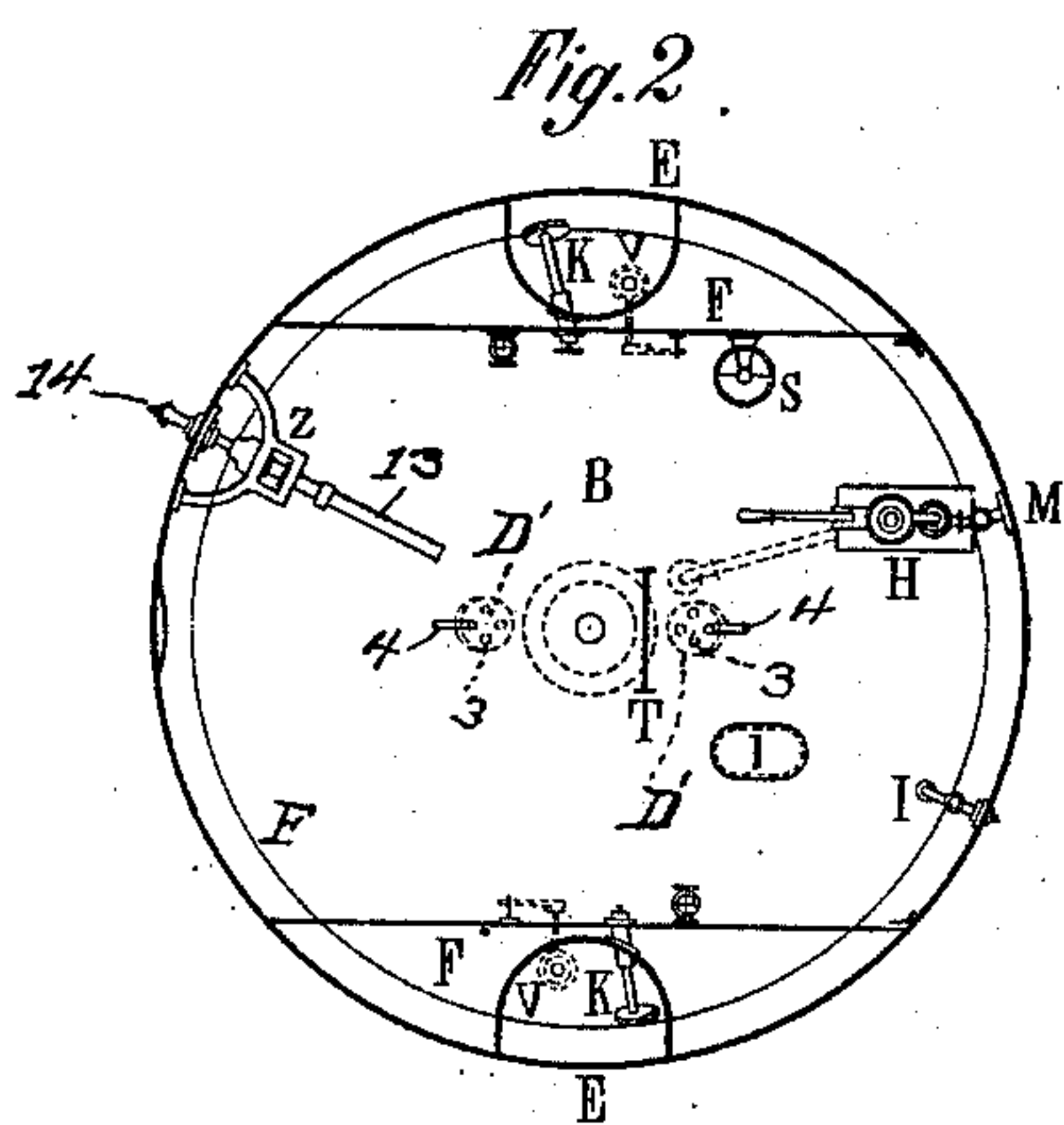
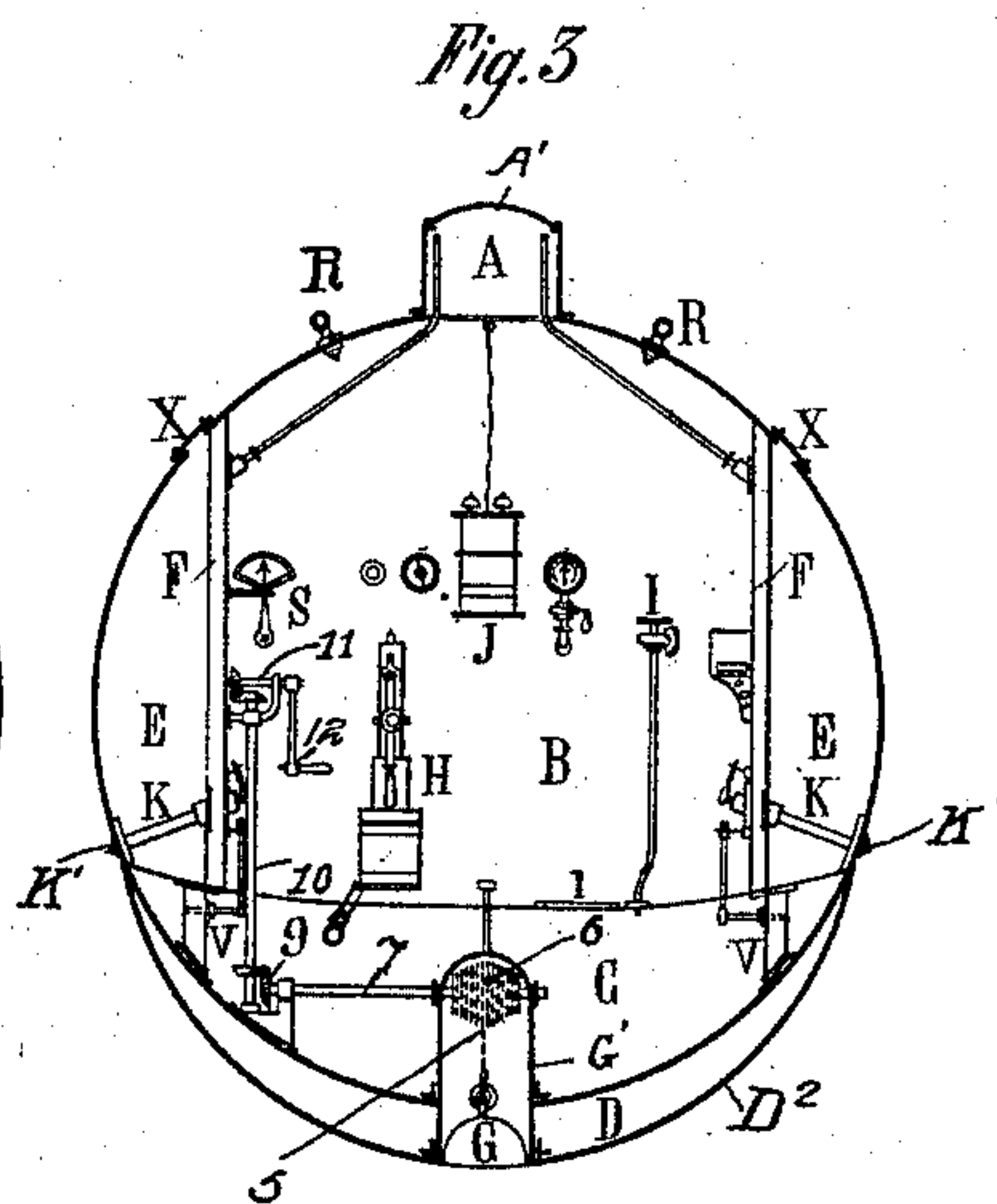
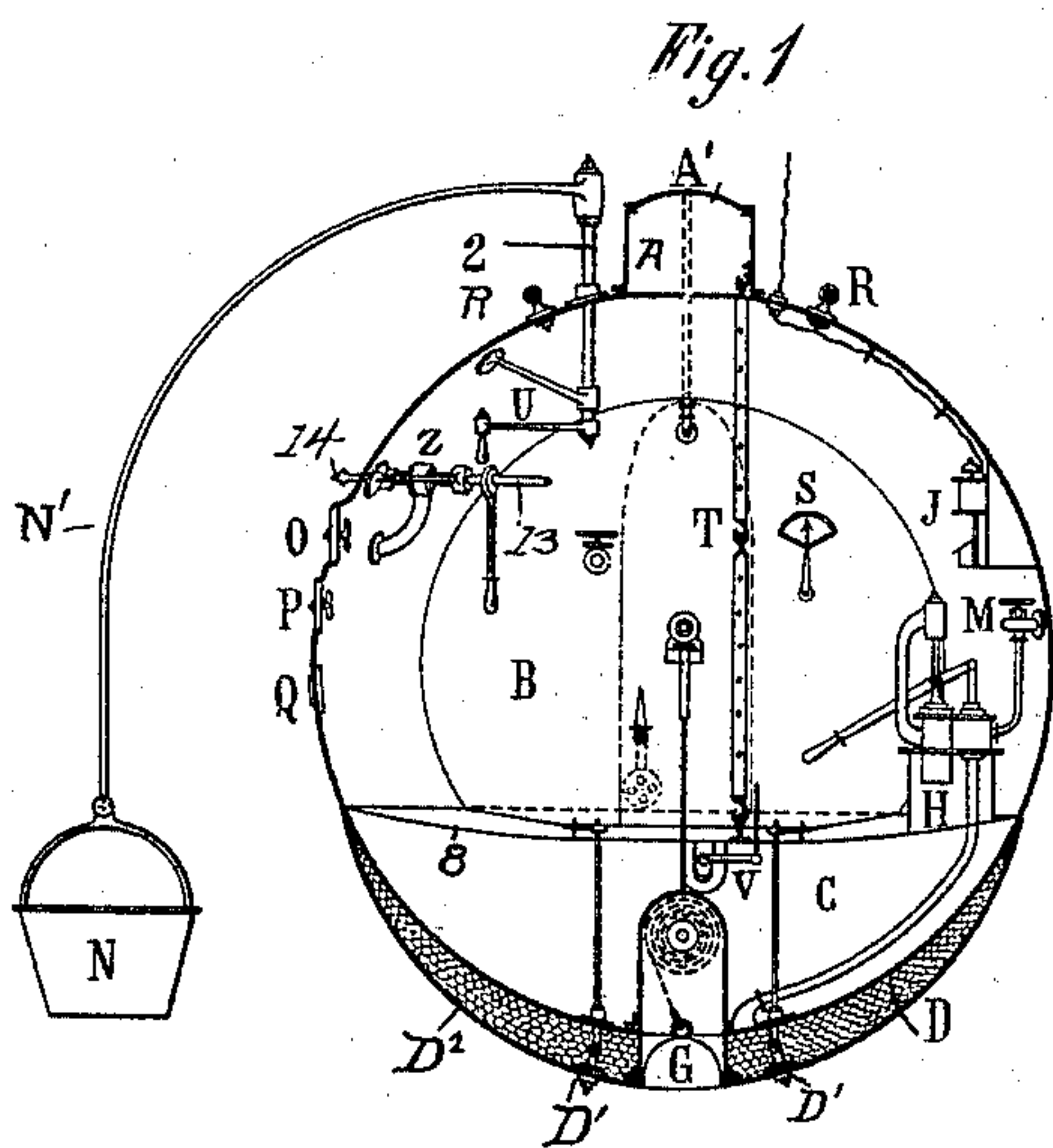
G. PINO.

APPARATUS FOR SUBMARINE WORK.

(Application filed Aug. 7, 1897.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
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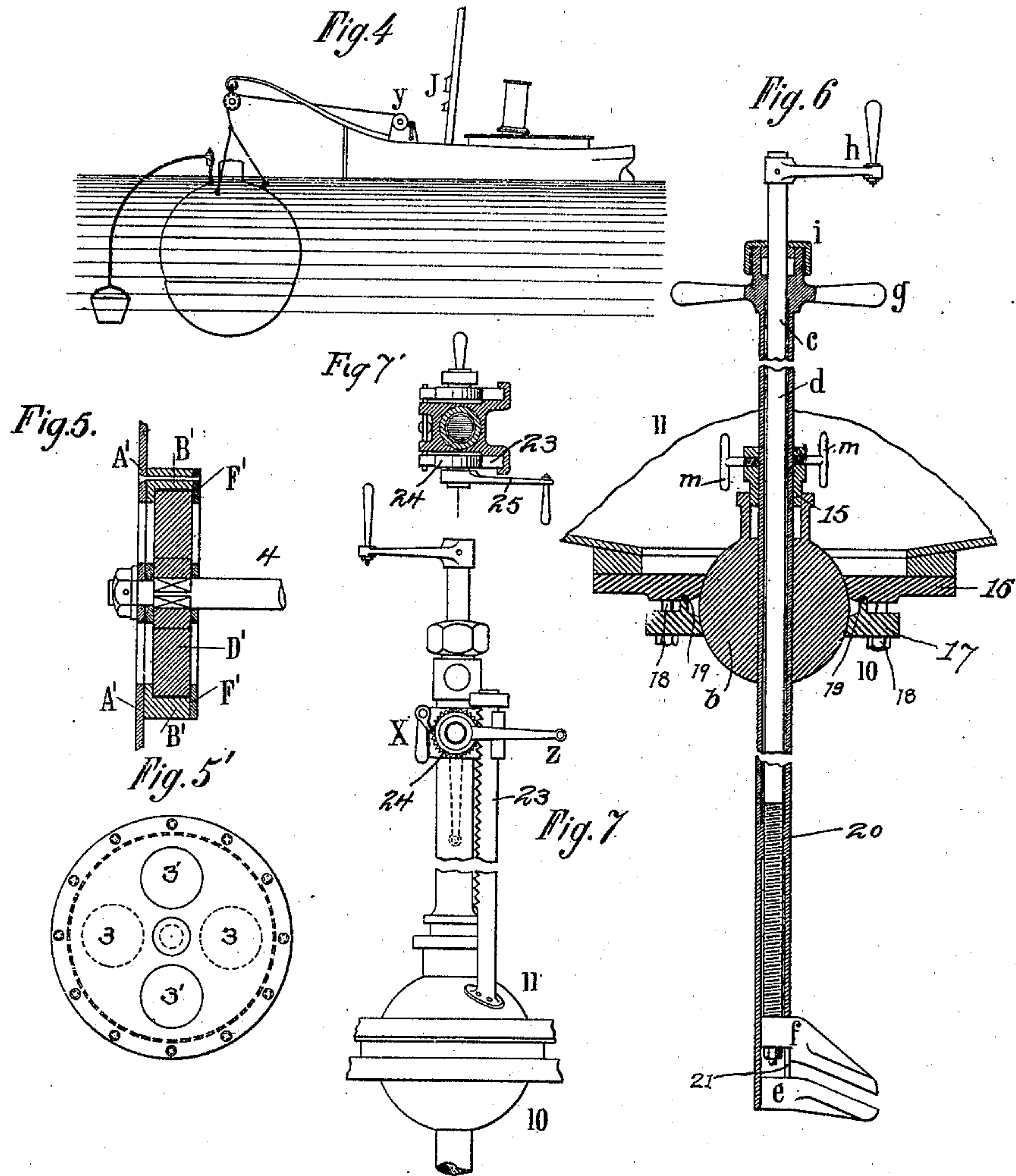
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3 Sheets—Sheet 2.



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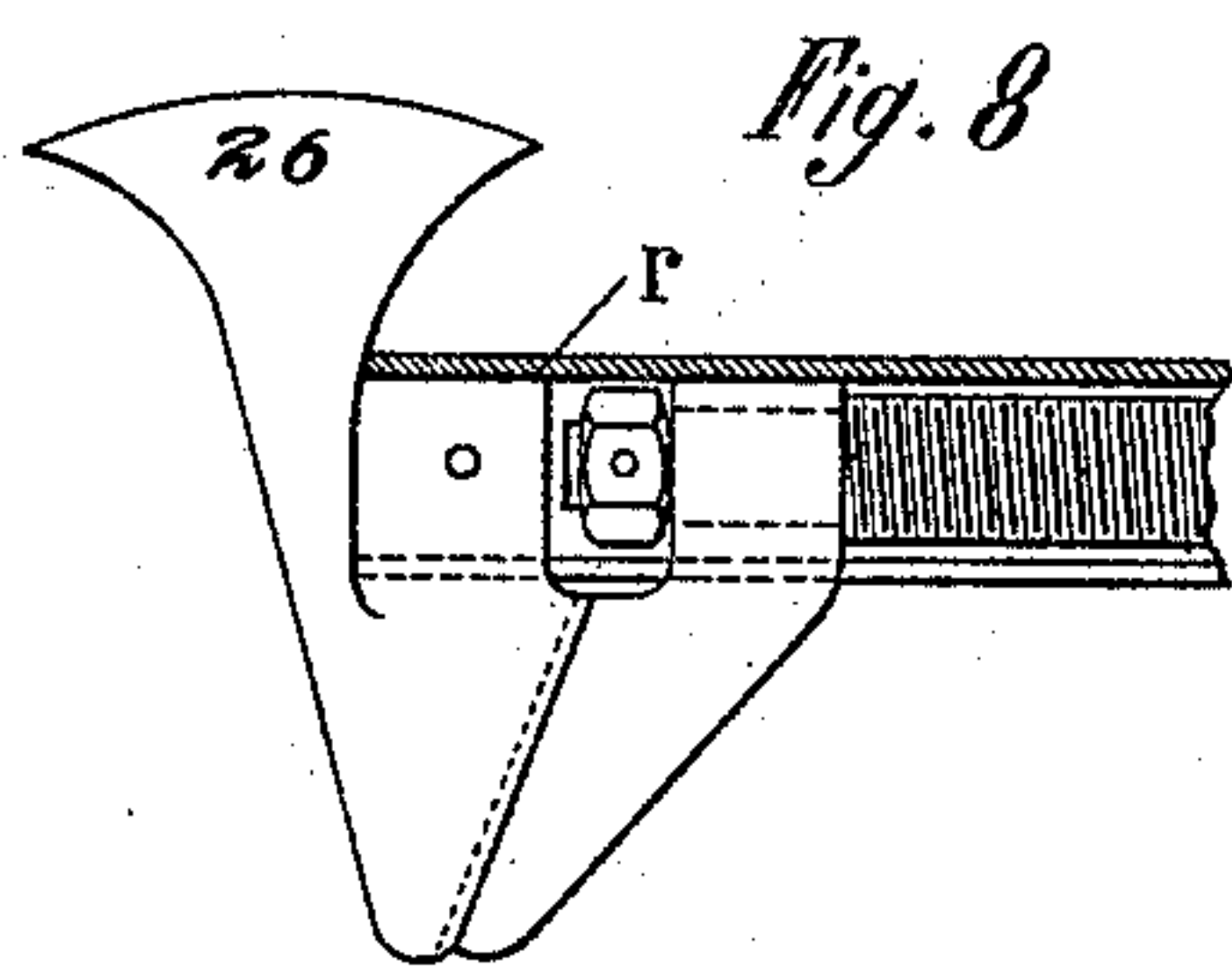


Fig. 8

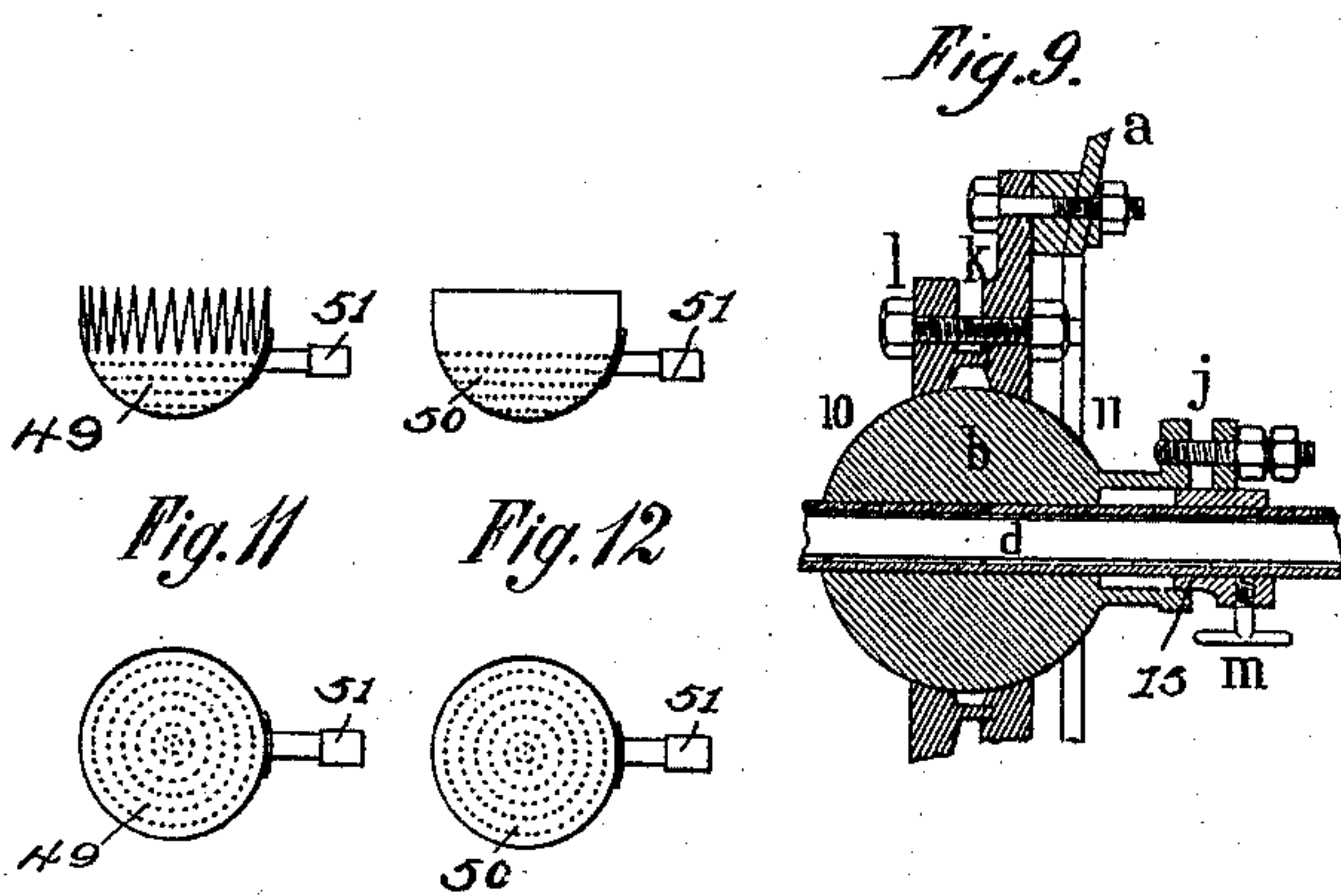


Fig. 11

Fig. 12

Fig. 9

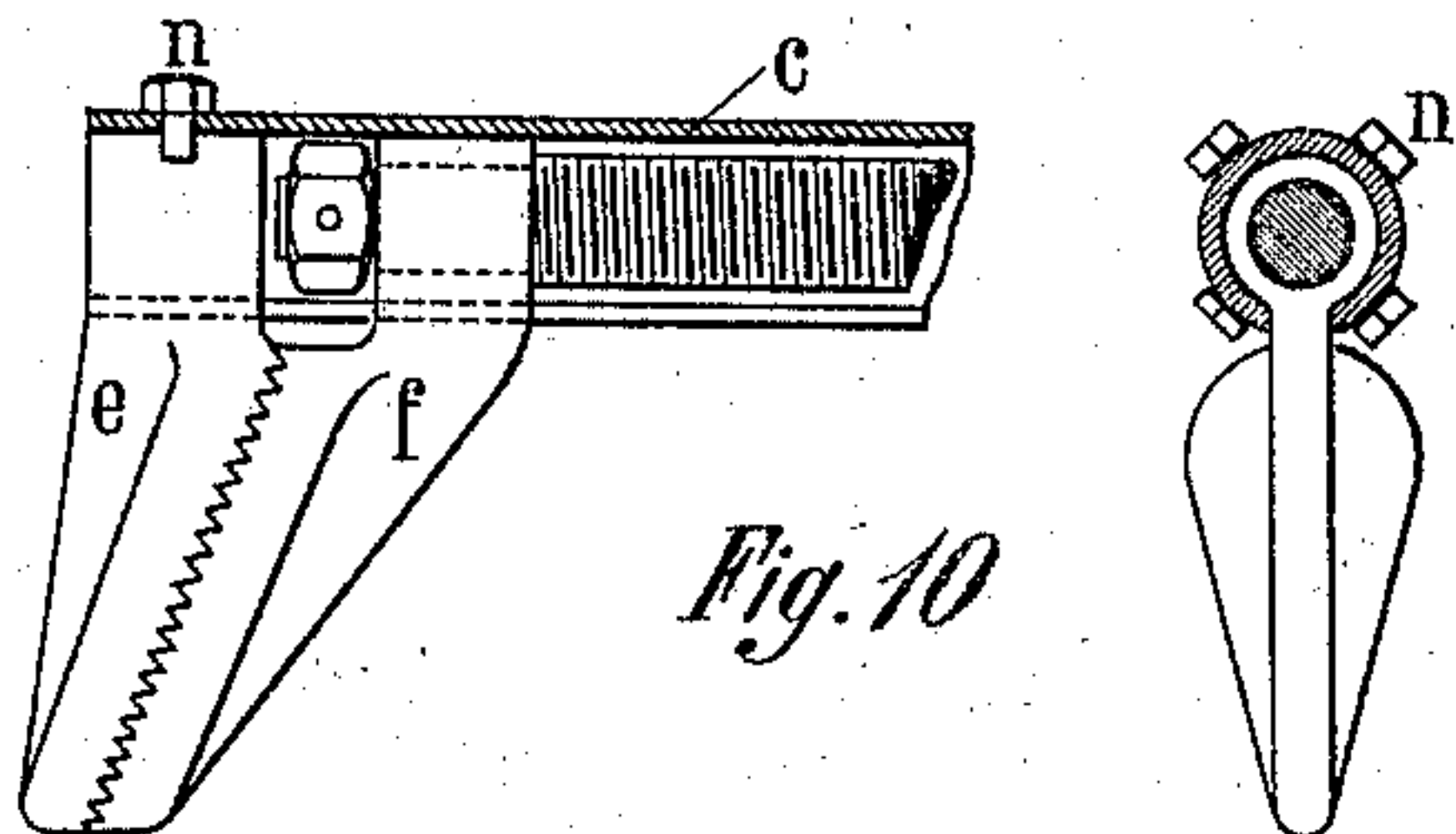


Fig. 10

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UNITED STATES PATENT OFFICE.

GIUSEPPE PINO, OF GENOA, ITALY.

APPARATUS FOR SUBMARINE WORK.

SPECIFICATION forming part of Letters Patent No. 612,458, dated October 18, 1898.

Application filed August 7, 1897. Serial No. 647,471. (No model.)

To all whom it may concern:

Be it known that I, GIUSEPPE PINO, a subject of the King of Italy, and a resident of Genoa, Italy, have invented certain new and useful Improvements in Diving Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the reference characters marked thereon, which form a part of this specification.

My invention relates to certain novel improvements in diving apparatus for submarine work, and the object is to provide a device of this kind whereby one or more persons may descend in the water and there perform the various operations, such as blasting, recovering wreckage, and the like.

To this end the invention consists in the construction, combination, and arrangement of the device, as will be hereinafter more fully described, and particularly pointed out in the claims.

The same reference characters indicate the same parts of the invention.

The accompanying drawings show my invention in the best form now known to me; but many changes in the details might be made within the skill of a good mechanic without departing from the spirit of my invention as set forth in the claims at the end of this specification.

Figure 1 is a vertical section of my improved diving apparatus. Fig. 2 is a horizontal section. Fig. 3 is a vertical section taken at a right angle to that shown in Fig. 1. Fig. 4 is a schematic view showing the manner of manipulating the device from a vessel. Fig. 5 is a section of one of the ballast-discharge valves. Fig. 5' is a front elevation of the same. Fig. 6 is an enlarged detail section of the grappling-bar. Fig. 7 is a detail of the drill-bar mechanism. Fig. 7' is a cross-section of the same. Fig. 8 is a modified form of the outer end of the grappling-bar. Fig. 9 is a section of the "ball-and-socket" joint employed on the grappling-bar, the drill-bar, and the propeller-shaft. Fig. 10 is a detail view of the outer end of the grappling-bar,

and the figure to the right is an end view of the same. Fig. 11 represents a rake which may be detachably secured to the end of the grappling or the drill bar for sponge-fishing, and the figure immediately below is a top plan view of the same. Fig. 12 represents a spoon or cup shaped device similarly attached for coral-fishing, and the figure immediately below is a top plan view of the same. Fig. 13 is a side elevation of the propelling mechanism. Fig. 14 is a top plan view of the same.

Referring to Fig. 1, Q represents the globular diving-bell, provided with the eyebolts R, by means of which it is suspended from a suitable boom or spar on a vessel, as shown in Fig. 4, so that it may be conveniently raised and lowered.

N represents a basket, bucket, or other receptacle suspended from the lower end of a curved arm N', the upper end of which is fixed to the projecting end of a vertical shaft 2, journaled in a stuffing or packing box in the dome of the bell, and the inner end of said shaft is provided with a crank U for manipulating the basket and swinging it around under the grappling-bar. Of course it will be understood that when the basket is filled with the recovered articles the diving-bell, with the basket, may then be raised to the surface and the basket emptied of its contents.

D² represents an auxiliary curved bottom fixed to the lower face of the bell, so as to provide a ballast-chamber D, the shell D² being formed with orifices 3 3, inclosed by a flange B', which encompasses a disk valve D', having a rubber packing F' and formed with the transverse orifices 3' and a valve-stem 4, by means of which said valve may be rotated on its axis to bring its orifices in alinement with the corresponding orifices in the shell or to present the solid portions of the valve across the orifices in the shell and close the valve.

G' represents a cylindrical tube or sleeve extending through the bottom of the bell and shell, open at its lower end and closed at its upper end, and G represents an anchor contained in said tube and adapted to be raised and lowered by means of the chain 5 on the windlass 6 on the horizontal shaft 7, journaled in

the upper end of the tube G'. One end of this shaft extends through the tube and into the chamber C, formed between the bottom of the bell and the floor 8, and the inner end of this shaft is provided with an angle-gear 9, which meshes with a corresponding gear on the lower end of the vertical shaft 10, the upper end of which is provided with an angle-gear, meshing with a corresponding gear on the counter-shaft 11, provided with a crank-handle 12 for conveniently manipulating the windlass from the inside of the bell.

H denotes a hand-pump for discharging the water-ballast in the chamber D through the valve M overboard.

F F represent vertical walls or partitions fixed on opposite sides of the bell above the floor 8 to form an auxiliary ballast-chamber E, and K K denote valve-rods for operating the valves K' K' to admit and discharge water-ballast from said chambers.

A represents the manhole, provided with a removable air-tight cap A', by means of which access may be had to the interior of the bell.

Z represents a bracket which may be fixed at one or more points in the bell to receive the drill-shaft 13, which extends through the wall of the bell, and its outer end is provided with the usual drill-bit 14.

O and P represent bull's-eye glasses, protected on the outside by suitable wire-netting to prevent breakage, and through them a light may be projected on the work in progress.

The grappling-bar consists of a tube *d*, sliding freely through a ball *b*, provided with a packing-box 15, and *m m* represent clamp-screws for rigidly securing the tube in the ball when desired. The ball *b* has a universal-joint movement through the wall of the bell and the collars 16 and 17, which are adjustably secured together by the bolts 18 18, the nuts of which may be manipulated from the inside of the bell, as occasion requires. The collar 17 is formed with an annular packing-flange 19, which fits a corresponding groove in the collar 16 to make a water-tight joint.

g denotes a transverse handle fixed on the inner end of the tube *d*, and *i* represents the packing-gland, through which the cylindrical rod *c* passes, its inner projecting end being provided with a crank-handle *h* for conveniently manipulating it. The opposite end of said rod *c* is screw-threaded to engage a correspondingly-threaded orifice in the sleeve 20, fixed in the tube *d*, and its extreme end is journaled in a diagonal jaw *f*, having a longitudinal movement in the slot 21, formed in the outer end of the tube, and *e* represents an aligned jaw removably fixed on the outer end of said tube by means of the set-screws *n*.

When the jaws of the grappling-bar have seized an article, the basket is swung around under the article and the grappling-bar moved

in or out, so as to suspend said article immediately over the basket. The jaws are now separated to release the article, which drops into the basket.

Referring to Figs. 11 and 12, 49 denotes the sponge-rake, and 50 represents the spoon or cup for gathering coral. Both of these implements are provided with a shank 51, which may be inserted between the jaws of the grappling-bar, whereby they may be conveniently manipulated.

In Fig. 7 I have shown a rack-bar 23 fixed at one end to the ball *b*, and its inner end extends through a guide-bracket X, fixed to the inner end of the tube *d*. A pinion 24 is journaled in said bracket, so as to mesh with said rack-bar, and it is provided with a crank-handle 25, by means of which the tube may be projected and withdrawn at will.

In Fig. 8 I have shown the gripper-jaws formed with overlapping shearing edges for severing cables, hawsers, and the like, and the opposite side of the fixed jaw is formed with an ax-blade 26 for chopping purposes.

Referring to Figs. 13 and 14, 27 denotes the propeller-shaft, provided with the ball 28, which has a universal-joint movement in the collars 29 30, and which are similar in construction to those heretofore described for the gripper-bar. The outer end of this shaft is provided with a propeller 31, which may be of any approved form, and the inner end of said shaft is journaled in a bracket 32, having a depending arm 33, the lower end of which is provided with a hand-screw 34, by means of which the bracket may be adjustably secured to the rail 35 to correspond to the position or angle to which the propeller-shaft may be adjusted. The inner end of this shaft is provided with a suitable pinion 36, which meshes with a gear 37, fixed on the counter-shaft 38, journaled in the bracket, and this outer end of said shaft is provided with a crank-handle, as shown, by means of which the propeller-shaft is rotated.

Having thus fully described my invention, what I claim as new and useful, and desire to secure by Letters Patent of the United States, is—

1. A submarine apparatus comprising the diving-bell Q, in combination with the basket N suspended from the arm N' fixed to the projecting end of the shaft 2 journaled in said bell, and means for imparting a horizontal movement to said basket from the inside of said bell, as and for the purpose set forth.

2. The combination with the spherical diving-bell Q, of the shell D² arranged to form the ballast-chamber D and the vertical parallel walls F F arranged to form the auxiliary ballast-chambers E, E, and the valves K' K' adapted to control the overboard-inlets to said chambers E, E, as and for the purpose set forth.

3. The combination with the diving-bell Q, the collars 16, 17 secured thereto, the lat-

ter formed with an annular packing-flange
and the former with a corresponding groove
to receive said flange, of the ball *b* journaled
in said collars, the tube *d* mounted in said
5 ball, the rod *c* having a longitudinal move-
ment in said tube and the gripper-jaws fixed
to the outer ends of said tube and rod, and
means for independently operating said tube

and rod from the inside of the diving-bell,
as and for the purpose set forth.

In testimony whereof I hereunto affix my
signature in presence of two witnesses.

GIUSEPPE PINO.

Witnesses:

LUIGI LECCHI,
STEFANA HENCKL.