A. EHRMANN.

SUBMARINE BOAT.

APPLICATION FILED JUNE 23, 1911.

1,014,959.

Patented Jan. 16, 1912.

3 SHEETS—SHEET 1.

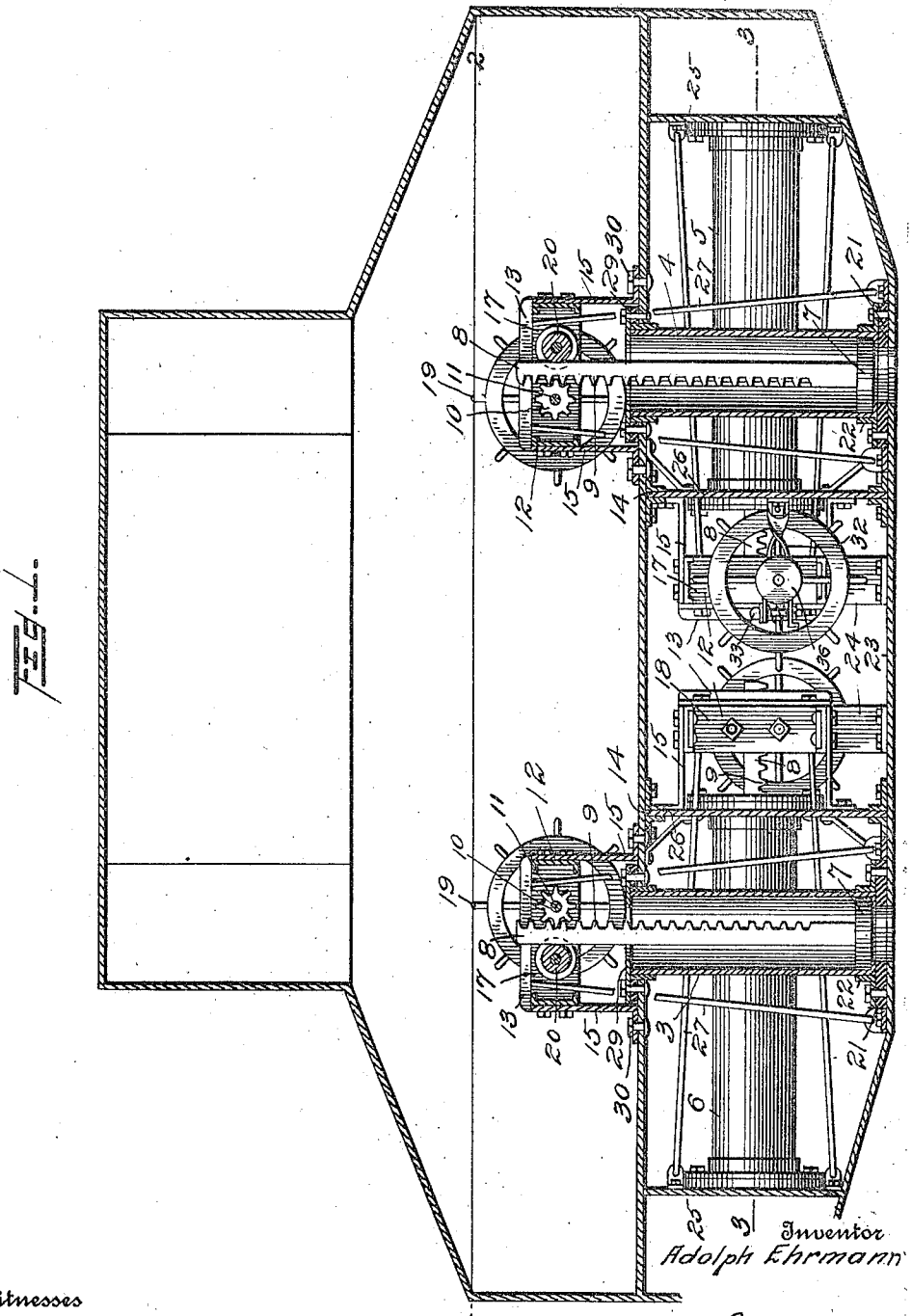

Fig. 1.

Witnesses

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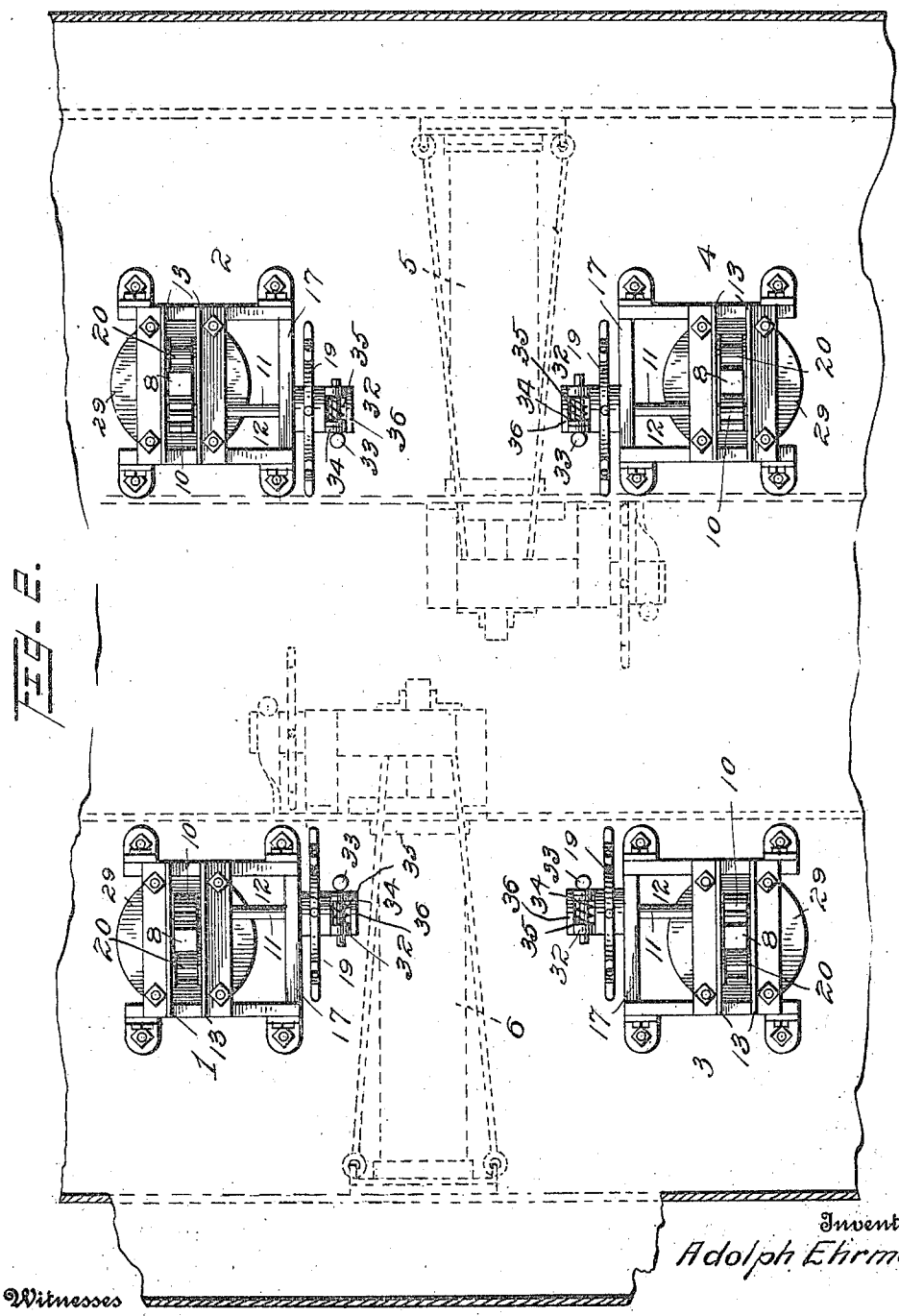

FIG. 2.

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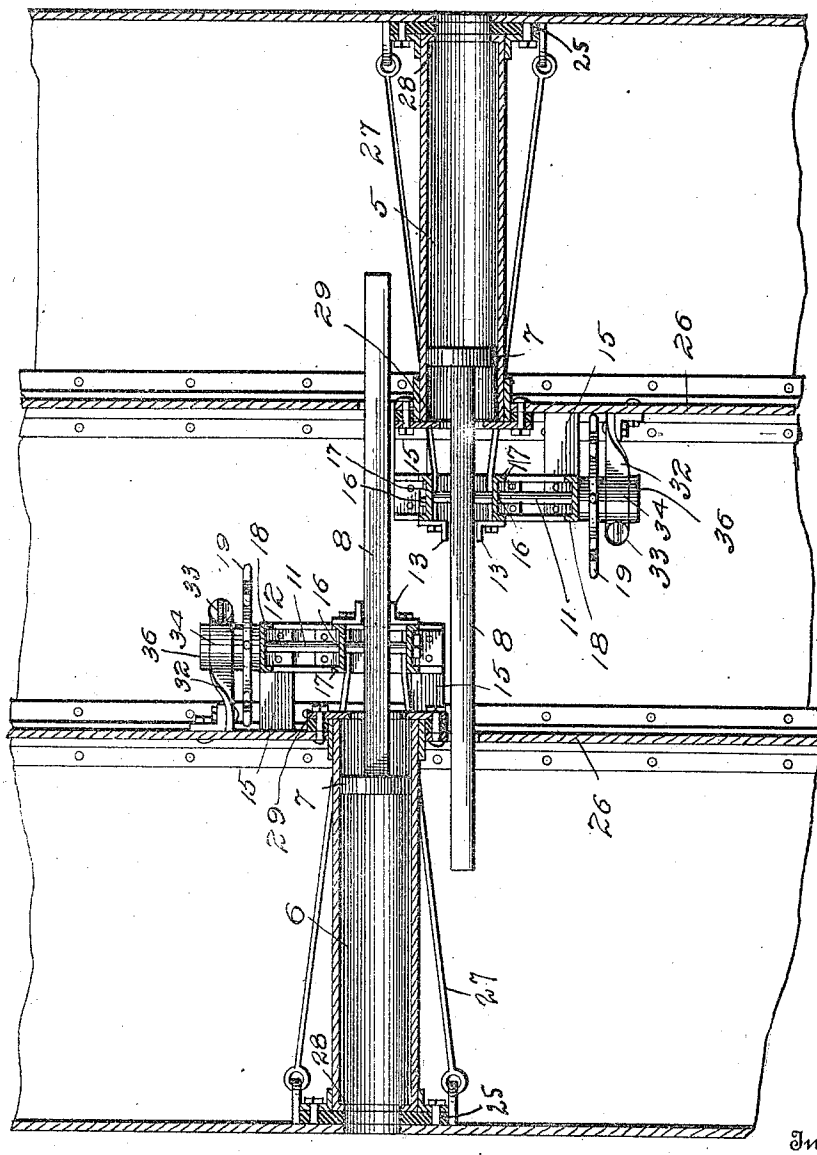
3 SHEETS—SHEET 3.

Fig. 7.



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UNITED STATES PATENT OFFICE.

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SUBMARINE BOAT.

1,014,959. Specification of Letters Patent. Patented Jan. 16, 1912.

Application filed June 23, 1911. Serial No. 634,653.

To all whom it may concern:

Be it known that I, ADOLPH EHRMANN, a citizen of the United States, residing at Eureka, in the county of McPherson and State of South Dakota, have invented certain new and useful Improvements in Submarine Boats, of which the following is a specification.

This invention has relation to new and useful improvements in submarine boats and the main object thereof is to provide efficient means for causing the descent of the boat below the surface of the water and its ascent from under the surface to the surface of the water, when desired.

My boat is to be provided with two horizontal and four vertical cylinders, preferably. Ordinarily, it is believed, the two horizontal cylinders will be sufficient to lower and raise the boat, but in case of the need of further cylinders, the four vertical ones, or any number of them that is necessary, can and should be utilized or called into service, or, if desired, the vertical cylinders only may be employed.

A minor object of my invention is to provide means for locking the cylinders in place when they have been adjusted to the proper position.

With the foregoing and other objects in view my invention consists of the novel features of construction, combination and arrangement of parts as are described in this specification, illustrated in the accompanying drawings forming a part thereof and particularly pointed out in the appended claims.

Reference being had to the drawings: Figure 1 is a vertical sectional view through my boat disclosing the two horizontal cylinders in side elevation and two of the four vertical cylinders in vertical section. Fig. 2 is a horizontal section taken through my boat on the line 2—2 of Fig. 1, illustrating the four vertical cylinders in top plan view, the horizontal cylinders being indicated by the dotted lines. Fig. 3 is a horizontal section through my boat, taken on the line 3—3 through the horizontal cylinders, centrally.

Referring more particularly to the drawings, in which like numerals designate like parts throughout, my invention is described as follows:

The boat is provided with four vertical cylinders 1, 2, 3 and 4 and two horizontal cylinders 5 and 6. Each of these cylinders is practically similar, slight differences existing between the horizontal and vertical cylinders which differences will be described fully hereinafter. Each cylinder is provided with a piston 7, which piston has extending rearwardly therefrom a piston rod 8. Said piston rods 8 are each provided with a plurality of teeth 9 which are engaged by respective pinions 10 keyed to respective shafts 11, said shafts each being mounted for rotation in a respective framework 12. Secured to the framework 12 are two parallel strips 13 between which strips the piston rods reciprocate, said strips act as guiding means for the piston rods thereby preventing them from swerving from one side to the other while the piston heads are being drawn inward or forced outward. The framework 12 of each cylinder is secured to the platform 14 by means of a plurality of braces 15, which braces are interposed between the framework and said platform. Said shaft 11 is rotatably mounted in the framework in bearings 16 of the beam 17 of said framework and the end beam 18 thereof. A hand wheel 19 is provided upon the end of the shaft without the framework for the rotation of said shaft when it is desired to draw the piston heads inward or force them outward. The piston rods 8 are held in engagement with their respective pinions 10 by means of a revolving shaft or roller 20 mounted for rotation between respective beams 17, said rollers or revolving shafts arranged oppositely to their respective pinions, so that each piston rod will be interposed between its respective pinion and revoluble roller or shaft. In case the cylinders are vertically disposed they are supported by a platform 21, in which case the lower end of each cylinder is secured to its respective platform by angle irons 22. In case the cylinders are arranged horizontally they are then supported by bottom of the boat 23. Braces 24 are interposed between the framework 12 of each horizontal cylinder and its respective platform, which braces are dispensed with in the vertical cylinders. The bases 21 of the vertical cylinders are simply the outer ends 25 of the cylinders when they are arranged horizontally while the second floor or platform 14 of the vertical cylinder is merely a compartment wall 26 in the horizontal cylinders.

It will be observed from examination of the drawings that the cylinders are so arranged that the piston rods thereof pass each other without interference. The ver-

tical cylinders are about one-half the height of the boat, thus providing ample space for operating them and for the vertical movement of the piston rods. The piston rods, if necessary, may pass upward into the tower or cupola.

Braces 27 are interposed between each platform 21 and its respective platform 14, said braces aiding in supporting the second platform as well as assisting to support the whole frame or cylinder and adding strength to the device. In the horizontal cylinder the braces 27 are interposed between the partition 26 and the end 25 of each cylinder.

The outer end of each cylinder is slightly reduced thereby producing a shoulder 28 forming a seat for the piston head when in extreme outward position. Annular plates 29 are provided at the inner end of the cylinders and are secured to the second platform in the case of the vertical cylinders by means of nut and bolt connections 30 and in the case of the horizontal cylinders to the partitions 26 also by nut and bolt connections 30, said annular plates provided with central openings for the passage of the piston rods. The piston heads 7 are also constructed of suitable material or covered by a suitable material that is adapted to prevent the leakage of water into the cylinders past the cylinder heads.

Provided upon each shaft 11 is a brake 32 which is utilized when the piston head of its respective cylinder is in proper position. This brake may be clamped upon the outer periphery of the shaft to which it is mounted by turning a screw-threaded bolt 33 which action draws together the spring arms 34 of the brake securing the shaft against rotation. A coil spring 35 encircles the screw-threaded bolt and normally secures the spring arms 34 out of contact with the shaft. A head 36 is provided at the extreme end of each shaft to prevent the outward movement of the brake during the operation of the device.

Although I have specifically described the novel features of the construction, combination and arrangement of the several parts of my invention, yet I do not confine myself to such construction, combination and arrangement of parts but reserve and may exercise the right to make such changes therein as do not depart from the spirit of the invention or the scope of the appended claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A submarine boat comprising a plurality of vertical and a plurality of horizontal cylinders, each of said cylinders provided with a reduced portion at its outer end forming a shoulder, an annular plate provided at the opposite end of the cylinder, said plate provided with a central opening therein, a piston head reciprocally held in each cylinder, each piston head binding against the shoulder of its cylinder when the same is in extreme outward position, a piston rod extending from the piston head inwardly and protruding through the opening in the plate, and means for the reciprocation of the piston heads, said means comprising a rack and a pinion.

2. A submarine boat comprising a plurality of vertical and a plurality of horizontal cylinders each of said cylinders provided with a reduced portion at its outer end forming a shoulder, an annular plate provided at the opposite end of the cylinder, said plate provided with a central opening therein, a piston reciprocally held in each cylinder, the piston head thereof binding against the shoulder of its cylinder when the same is in extreme outward position, the piston rod of each piston extending inwardly and protruding through the opening in the plate, said piston rods provided with a plurality of teeth upon one of their edges, means for the reciprocation of each piston head comprising a frame, a pinion rotatably mounted within the frame, the teeth of said pinion engaging the teeth of its respective piston rod, means to secure the teeth of the pinion in engagement with the teeth of said piston rod and means for the rotation of said pinion in either direction.

3. A submarine boat comprising a plurality of cylinders which are adapted to receive water without the boat, each of said cylinders provided with a piston reciprocally held therein, said piston comprising a piston head and a piston rod extending from the head inwardly, the piston rod provided with a plurality of teeth, a frame secured to the inner end of the cylinder, a pinion rotatably held in said frame, means comprising a revolving shaft to secure the teeth of the piston rod in engagement with the teeth of the pinion, means for the rotation of the pinion in either direction thereby drawing the pinion inward or forcing it outward as desired, and means to lock the shaft upon which said pinion is keyed against rotation when the piston has been placed at the desired point within said cylinder.

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

ADOLPH EHRMANN.

Witnesses:
THEO. J. P. GIEDT,
THOMAS RINGSRUD.