

No. 750,577.

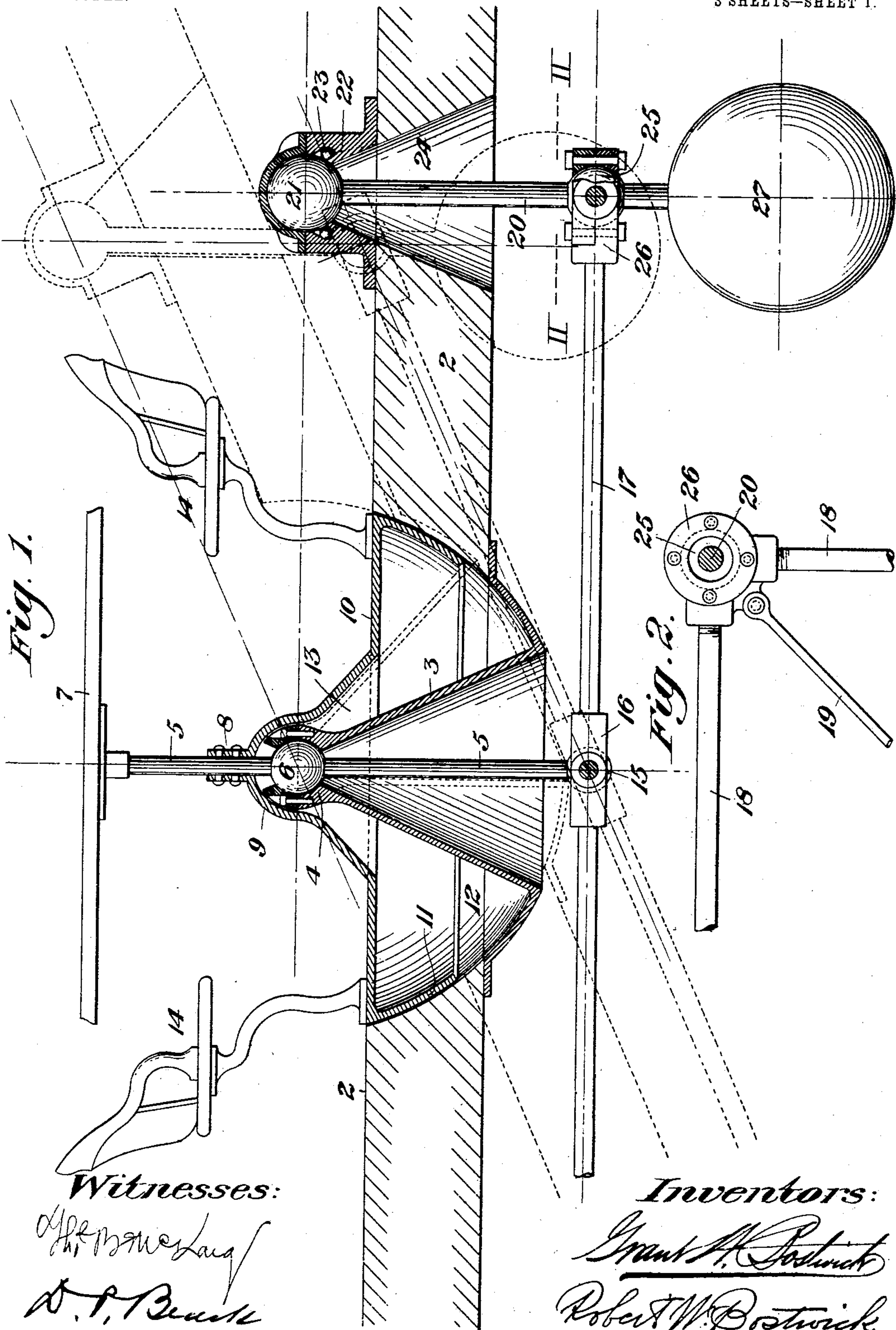
PATENTED JAN. 26, 1904.

G. W. & R. W. BOSTWICK,  
SELF LEVELING FURNITURE.

APPLICATION FILED APR. 1, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



*Witnesses:*

Alpenrose Lang  
W. P. Beale

*Inventors:*

Grant A. Postwick  
Robert W. Postwick

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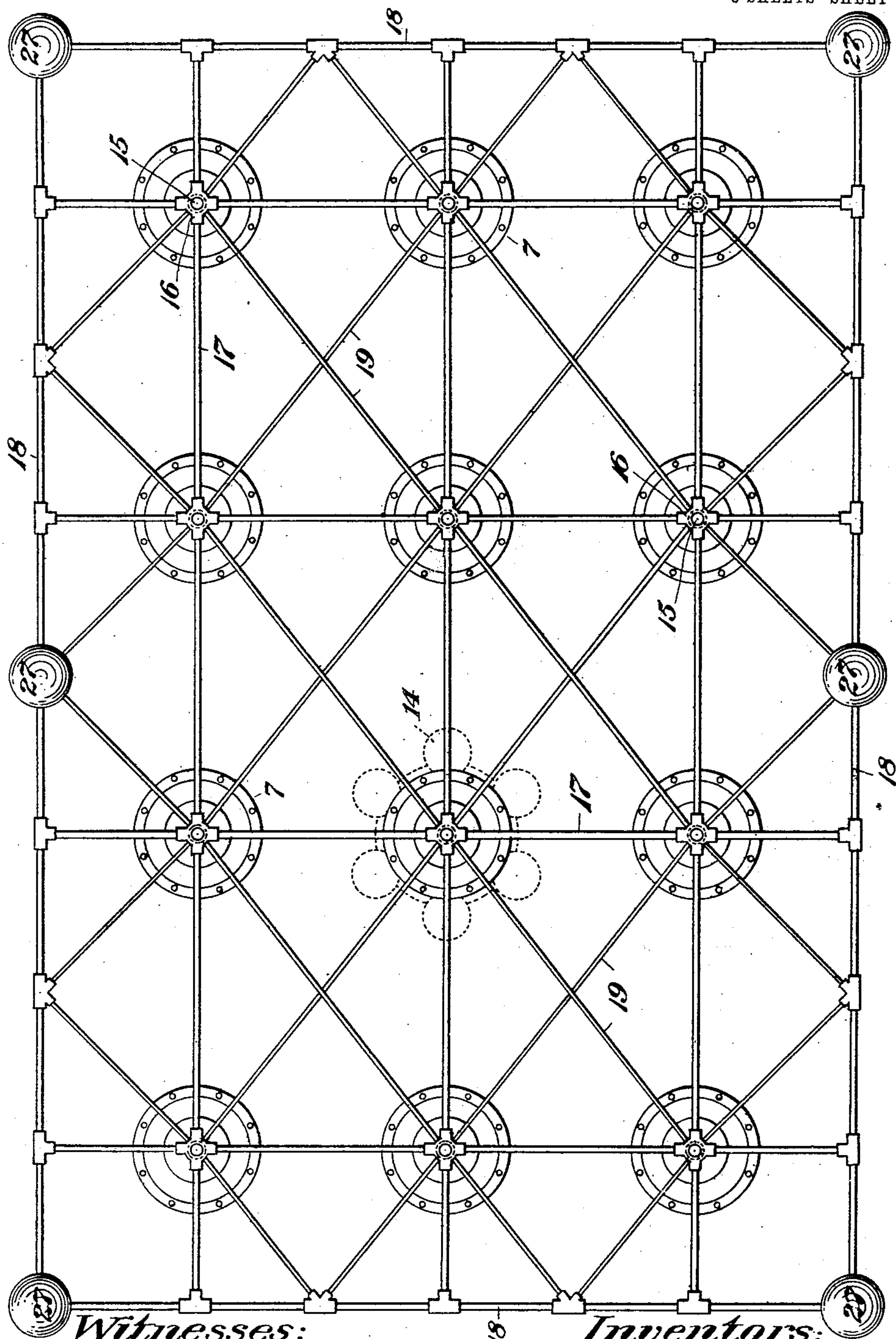
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NO MODEL.

3 SHEETS—SHEET 2.

Fig. 3.



Witnesses:

*A. H. Mervin*  
*D. P. Bunker*

Inventors:

*Grant A. Bostwick*  
*Robert W. Bostwick*



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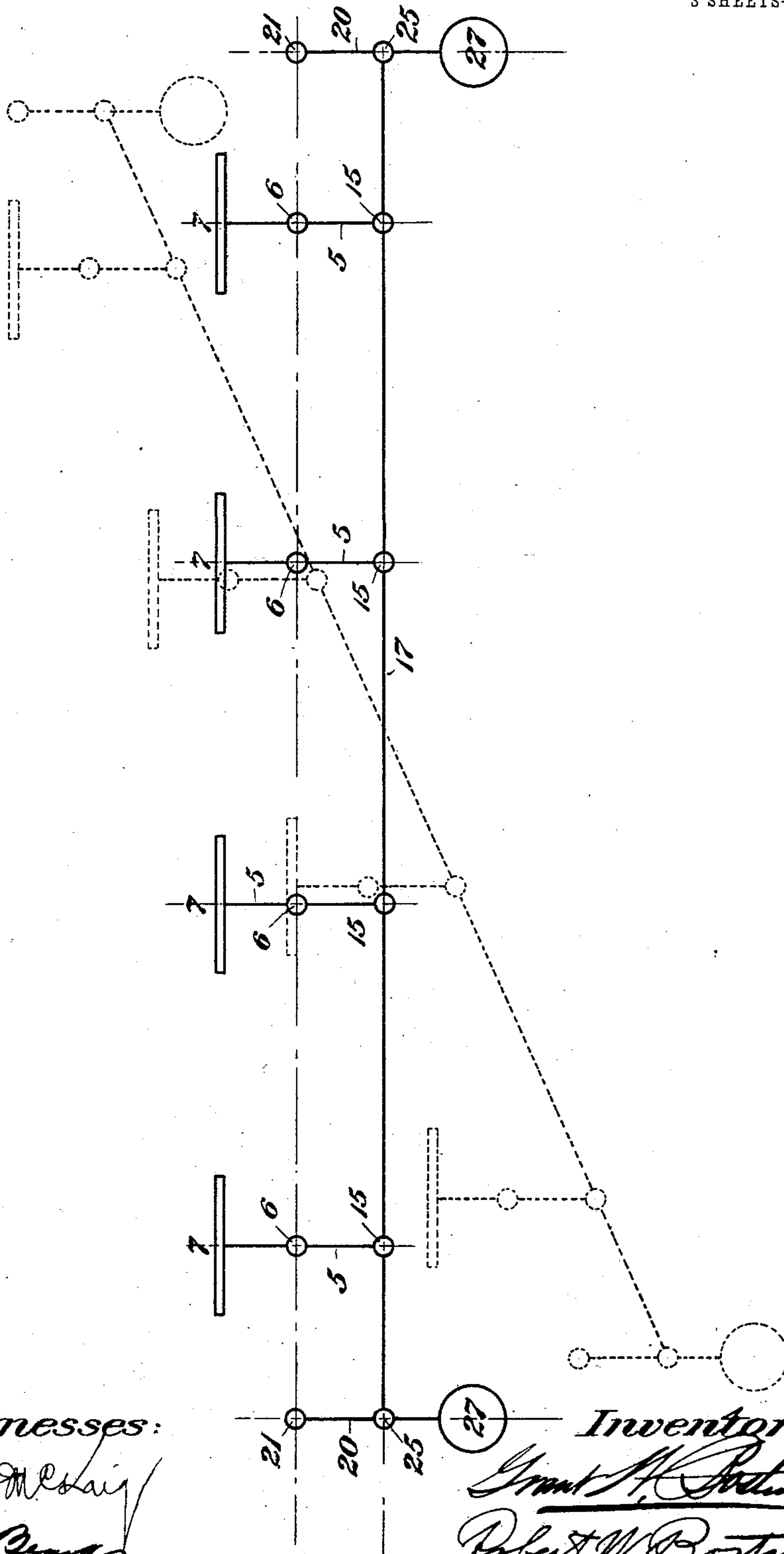
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NO MODEL.

3 SHEETS—SHEET 3.

Fig. 4.



Witnesses:  
*L. H. Bostwick*  
*D. P. Bostwick*

Inventors:  
*G. W. Bostwick*  
*Robert W. Bostwick*

# UNITED STATES PATENT OFFICE.

GRANT W. BOSTWICK AND ROBERT W. BOSTWICK, OF PITTSBURG,  
PENNSYLVANIA.

## SELF-LEVELING FURNITURE.

SPECIFICATION forming part of Letters Patent No. 750,577, dated January 26, 1904.

Application filed April 1, 1903. Serial No. 150,576. (No model.)

*To all whom it may concern:*

Be it known that we, GRANT W. BOSTWICK and ROBERT W. BOSTWICK, citizens of the United States, residing at Pittsburg, in the  
5 county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Self-Leveling Furniture, of which the following is a specification, reference being had therein to the accompanying  
10 drawings, forming part of this specification, in which—

Figure 1 is a view in sectional elevation of our improved self-leveling table with a portion of the connected counterweight-controlling framework. Fig. 2 is plan view of one  
15 of the ball-bearings of the frame, taken on the line II II of Fig. 1. Fig. 3 is an under plan view of the controlling-frame and its connected counterweights, showing the arrangement of a series of gravity-controlled  
20 tables. Fig. 4 is a diagrammatic vertical sectional view showing a series of tables in their normal position and indicating in dotted lines the varying positions of the tables and of the  
25 gravity-actuated controlling means.

Our invention relates to improvements in self-leveling furniture and other apparatus or device with particular reference to a table  
30 and a series of seats connected therewith of the type of such furniture as is used on floating vessels or other similar structures subject to variation from a horizontal position, as to decks or floor-levels.

The objects in view have been to provide  
35 an integral structure with a central supporting element adapted to normally conform to and to be maintained in a vertical position independent of its supporting-foundation and to the means whereby a series or plurality of  
40 such vertical supporting devices and the superimposed table and chairs are simultaneously controlled and maintained, so that the table will be constantly held in a horizontal position and the chairs in unvarying relation  
45 to the table.

Referring now to the drawings, 2 represents the floor or deck of a vessel upon which is supported a coniform upwardly-projecting hollow support 3, preferably formed of cast

metal, either solid or of other suitable design, 50 in the upper portion of which is provided the ball-bearing 4, having interior spherical surfaces.

The construction of the ball-bearing terminals is preferably separable and so designed 55 that it will permit of the easy assemblage of the parts and with sufficient clearance-openings and space for oscillating movement around the central supporting-stem.

The central supporting-stem 5 is provided 60 with a sphere or ball 6, secured to or formed integral with the stem and adapted to neatly fit in the interior of the ball-bearing support 4, the stem extending upwardly and downwardly, as clearly shown, and secured to and  
65 supporting at its upper end the article of furniture, as a table 7, as shown in Fig. 1.

Rigidly connected with the stem 5 above the ball-bearing in any suitable manner, as indicated at 8, is a downwardly-depending surrounding base 9, preferably flared outwardly 70 and continued on a horizontal plane to provide a floor 10 of circular plan form. The floor 10 is preferably also provided with a downwardly-depending peripheral flange 11 75 to provide an inner closing-wall adapted to interfit with the edge of the receiving-cavity. The flange also gives added strength and may be of any depth desired; but it may, however, be dispensed with without affecting the operation of the device. 80

The space beneath the floor and through the deck is hollowed out in bowl form, as indicated at 12, and, as shown in Fig. 1, the lower portion of the coniform support 3 is so shaped 85 as to form a continuation of such hollow interior, being secured to the under portion of the deck by flanges, as shown, or in any suitable manner.

The downwardly and outwardly sloping portion 9 of the floor-support is preferably flared 90 out at a considerable angle, so as to provide an intervening space 13 between it and the exterior wall or frame 3, thus providing sufficient space to allow of the oscillating movement of said frame in conformity with such movement as is imparted to the deck of the vessel. 95



As thus constructed, it will be seen that if the stem 5 is maintained in a vertical position independent of the movement of the deck the surrounding edges of the deck may undulate, rise, or fall at any point (either longitudinally or laterally) and that the floor-surface 10 will remain level and will always maintain a close interfitting joint with the inner surface of the bowl-cavity 12. It will be understood that to insure such interengagement the outer spherical surface of flange 11 and the inner spherical surface of the bowl have common radii centering in the ball 6.

A particular feature of advantage of this construction is that the passage of small articles between the floor is prevented, as is likewise the engagement of skirts or other similar material, while a finished appearance is always insured.

Rigidly mounted on the floor 10 by suitable supports are the seats 14 in proper relation to the surface of the table and to the sloping wall 9, so that this wall will provide suitable and convenient foot-rests, if desired.

The lower end of the stem 5 terminates in a ball 15, which is engaged by a surrounding ball-bearing 46 of any suitable design adapted to provide for free movement and oscillation, and with which ball-bearing are connected the rods or other elements 17 of a lower depending regulating-framework, by which the stem 5 is always maintained in a true vertical position.

As shown in Fig. 3, the rods 17 of the framework diverge in opposite directions from the ball-bearings 16 both longitudinally and laterally and are connected in one entire structure by a surrounding similar frame 18, while diagonal truss-rods 19 or any other suitable bracing elements are incorporated with the frame, so as to provide a rigid unyielding structure on a normally general plane.

As shown in Fig. 3, a series of twelve tables are assembled and connected with such controlling-framework, although it will be readily understood that a single table or any desired number may be similarly arranged, according to the dimensions or design of the vessel or other structure, and that they may also be arranged in a continuous line, if desired, and we have not considered it necessary to show such various arrangements, as they are more properly within the province of the designing engineer or builder.

At the corners of the controlling-frame and at intermediate positions, if desired, are located supporting stems or rods 20, provided at their upper portions with balls 21, adapted to rest in universal or ball bearings 22 of any suitable design and preferably extending above the deck-surface for economy of space and located on the same level with balls 6. If desired, these bearings may be also provided with an annular interior row of balls 23, as shown in Fig. 1, the lower interior portion of

the bearing and of the deck being hollowed out, as indicated at 24, to permit vibration or oscillation around the stem 20. The stems 20 are provided with supporting-balls 25, around which are the embracing ball-bearings 26 of the controlling-framework either at the corners or intermediate positions and by which bearings the framework is partially supported. It will also be understood that a portion of its weight is carried by the depending balls 15 of the stem 5. To the lower end of the stems 20 are attached the gravity weights or balls 27 of suitable weight and resultant leverage and designed to suit varying conditions for each particular case, but preferably of several hundredweight, so as to provide effective inertia. As thus constructed it will be seen that the weights 27 will constantly tend to hold the stem 20 in a vertical position by reason of the fact that all of the stems 20 are connected by the rigid framework 17. It will also be seen that the force of each weight will be exerted throughout the framework in every direction, so as to correct the tendency of any of the stems to assume other than a vertical position, and it also follows that the stems 5 will be absolutely controlled by the rigid frame and will all be maintained in a vertical position. This is due not only to the accumulated inertial force of the connected weights, but also to the excessive leverage which results from their joint and simultaneous operation exerted through the frame in a lateral direction against the lower ends of stem 5.

The leverage of the frame as thus constructed is proportionally greater than any tendency of the stems 5 or their supported furniture to deviate from vertical and horizontal positions, respectively, independent of whatever load is carried by the tables or however distributed.

We are aware that self-leveling devices for furniture have been patented wherein a counterweight is attached to the vertical stem of an upper table, but believe that we are the first to provide the mechanism shown and described whereby the corrective inertial action of a frame and a series of surrounding connected independent weights is applied to one or a series of pendently-arranged supporting-stems.

The operation is obvious from the foregoing description. The advantages of the invention will be appreciated by all those who are skilled in the art. It is very efficient, simple, durable, and inexpensive, and is capable of installation without interfering with the head room under decks, while requiring but a minimum of space either above or below.

Changes and variations may be made in the design, proportions, arrangement, or other details of construction by the skilled mechanic; but all such are to be considered as within the scope of the following claims.

What we claim is—

1. In a self-leveling apparatus, a support-



ing-stem provided with a bearing-ball, a socket-bearing therefor, a table-top supported by the stem, and a floor-plate secured to the stem and provided with seats, with means for holding the stem in a vertical position, substantially as set forth.

2. In a self-leveling apparatus, a supporting-stem provided with a bearing-ball, a hollow coniform support terminating in a bearing-socket, a table-top supported upon the stem, a base secured to the stem and provided with a surrounding downwardly-extending middle portion and a peripheral flat floor portion, with seats secured to the floor portion, and means for maintaining the stem in a vertical position, substantially as set forth.

3. In a self-leveling apparatus, a supporting-stem provided with a bearing-ball, a hollow coniform support terminating in a bearing-socket, a table-top supported upon the stem, a base secured to the stem and provided with a surrounding downwardly-extending middle portion and a peripheral flat floor portion having a downwardly-extending spheroperipheral flange, a bowl-shaped cavity therefor, seats secured to the floor portion, and means for maintaining the stem in a vertical position, substantially as set forth.

4. In a self-leveling apparatus, the combination with a supporting-stem provided with an attached table and chair support, a universal bearing-support and a downward extension; of a gravity-actuated controlling-frame in engagement with the stem and suspended from bearings on the same plane as said universal bearing-support, substantially as set forth.

5. In self-leveling apparatus, the combination with a supporting-stem provided with an attached table and chair support, a universal bearing-support and a downward extension, of a gravity-actuated controlling-frame, hav-

ing a universal joint in engagement with said stem and supporting means suspended from bearings and connected with the frame on the same planes respectively, as the said bearings, substantially as set forth.

6. In a self-leveling apparatus, the combination with a supporting-stem provided with an attached table and chair support, a universal bearing-support and a downward extension, of a gravity-actuated controlling-frame, having a universal joint in engagement with said stem and supporting means suspended from bearings and connected with the frame on the same planes respectively, as the said bearings, and carrying controlling-weights, substantially as set forth.

7. In a self-leveling apparatus, the combination with a supporting-stem provided with a table-top, a universal bearing-support and a downward extension; of a gravity-actuated controlling-frame in engagement with the stem and a series of independent depending weights and stems connected with the frame at positions lateral to the stem, substantially as set forth.

8. In a self-leveling apparatus, the combination with a supporting-stem provided with a table-top, and a connected floor with seats mounted thereon, and a downward extension; of a gravity-actuated controlling-frame in engagement with the stem and a series of depending weights connected with the frame, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

GRANT W. BOSTWICK.  
ROBERT W. BOSTWICK.

Witnesses:

THOS. B. McLAIG,  
D. B. BEACH.