

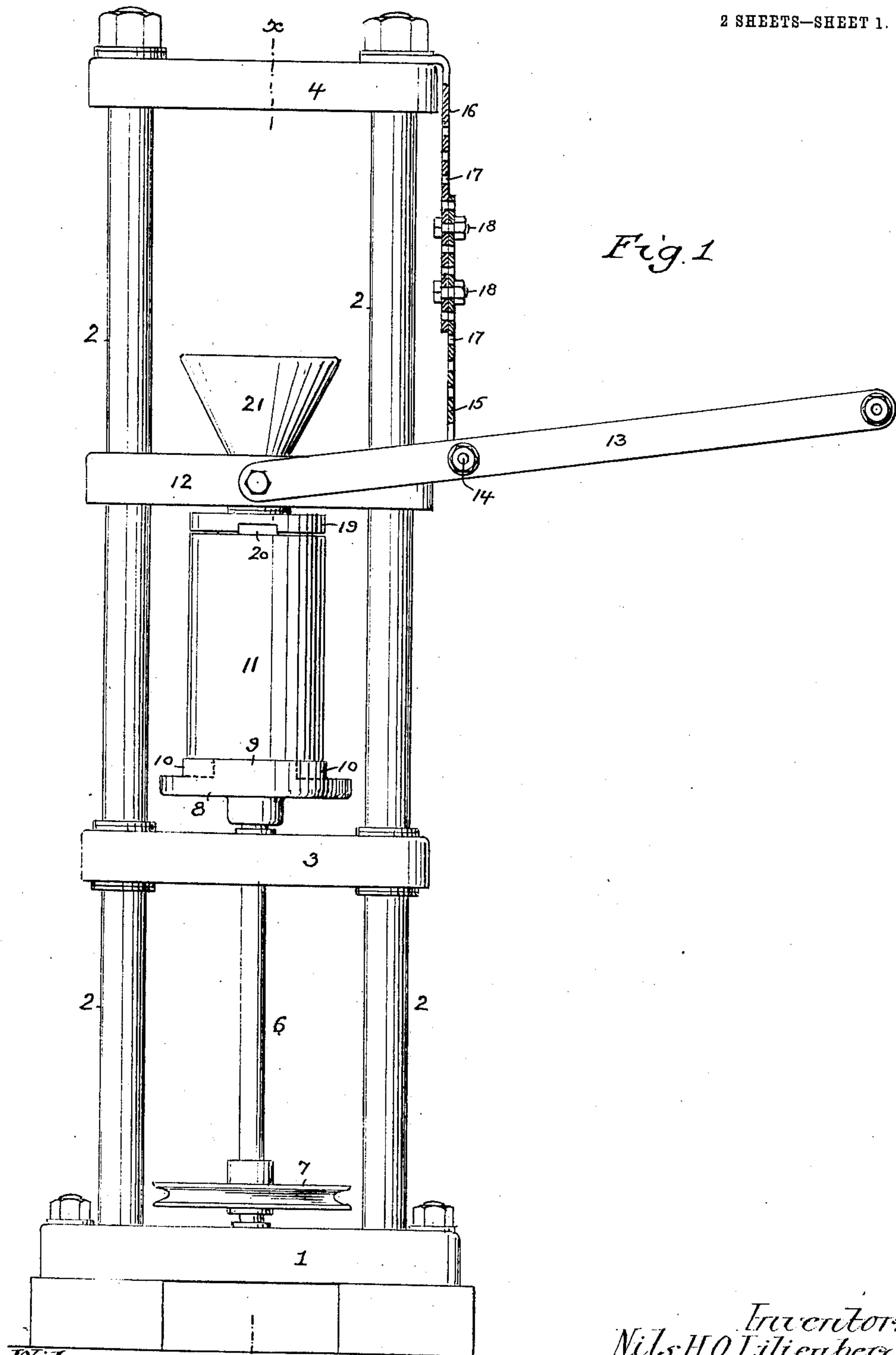
No. 839,861.

PATENTED JAN. 1, 1907.

N. H. O. LILIENBERG.  
INGOT CASTING MACHINE.

APPLICATION FILED MAR. 14, 1904.

2 SHEETS—SHEET 1.



*Fig. 1*

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Nils H. O. Lilienberg  
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2 SHEETS—SHEET 2.

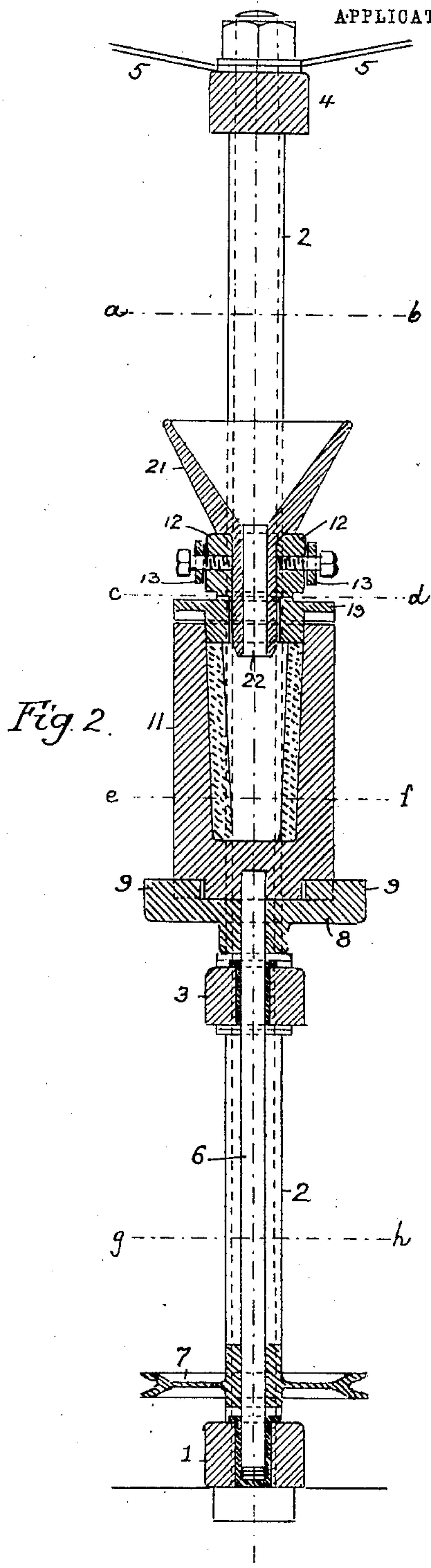


Fig. 2.

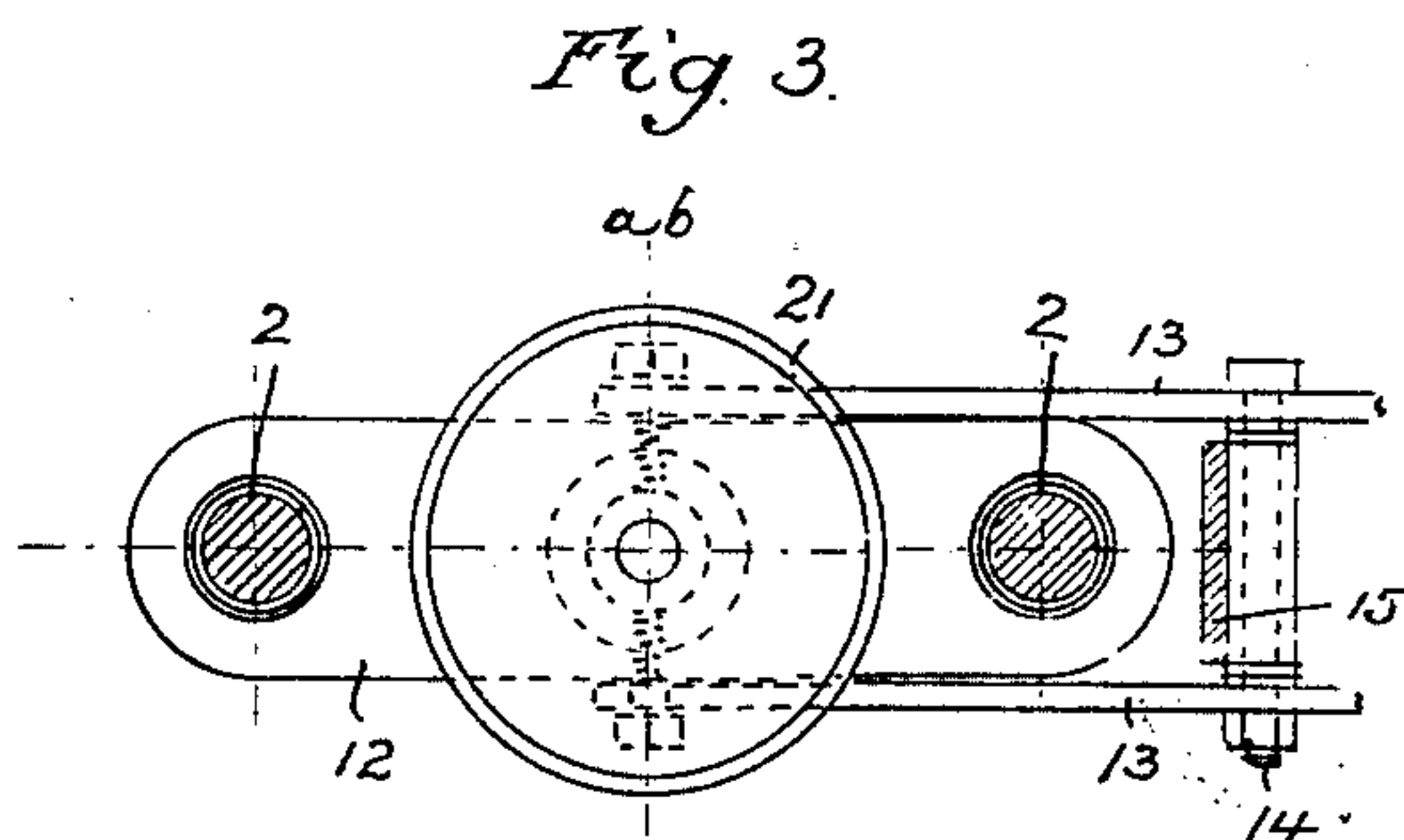


Fig. 3.

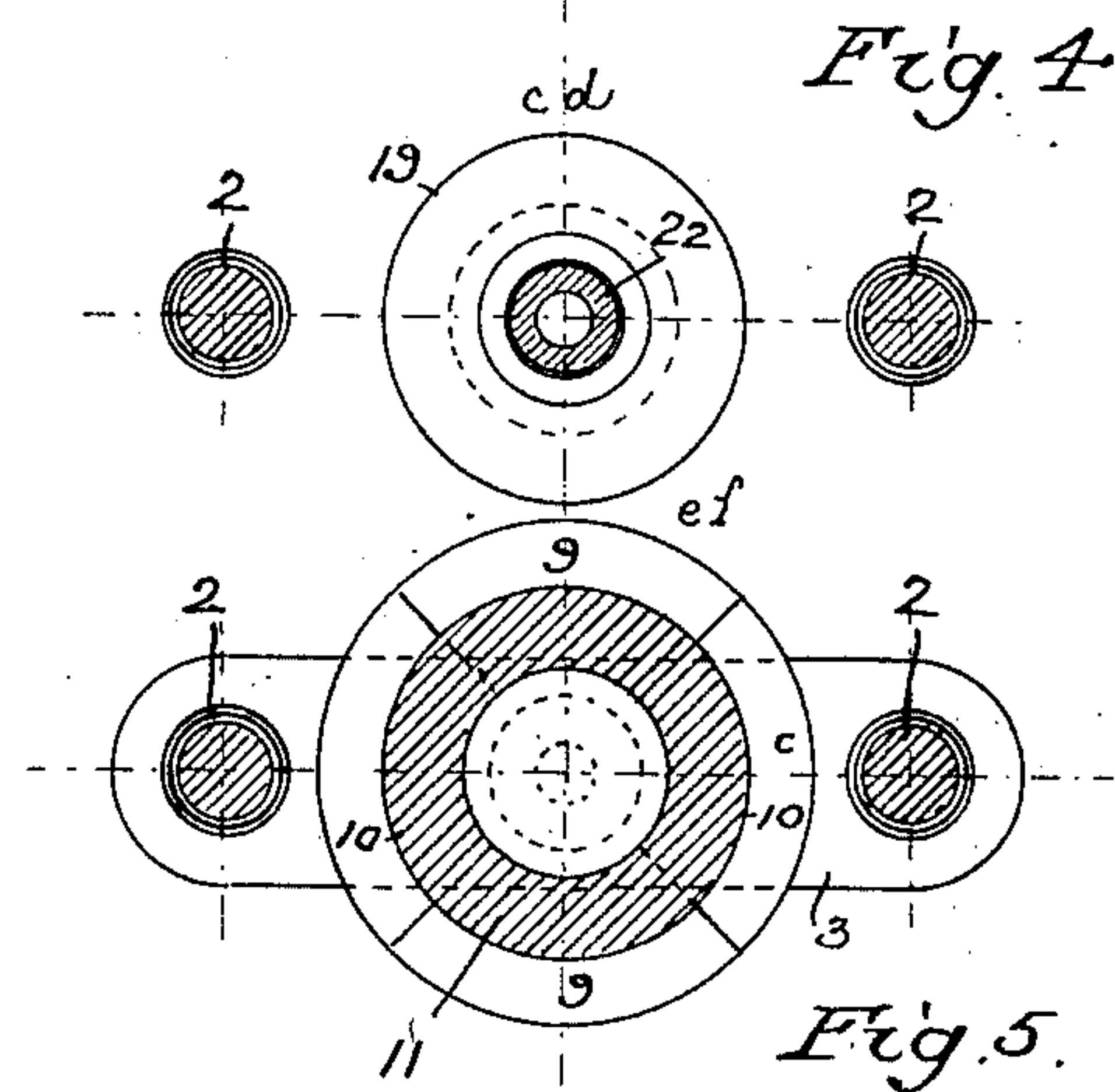


Fig. 4.

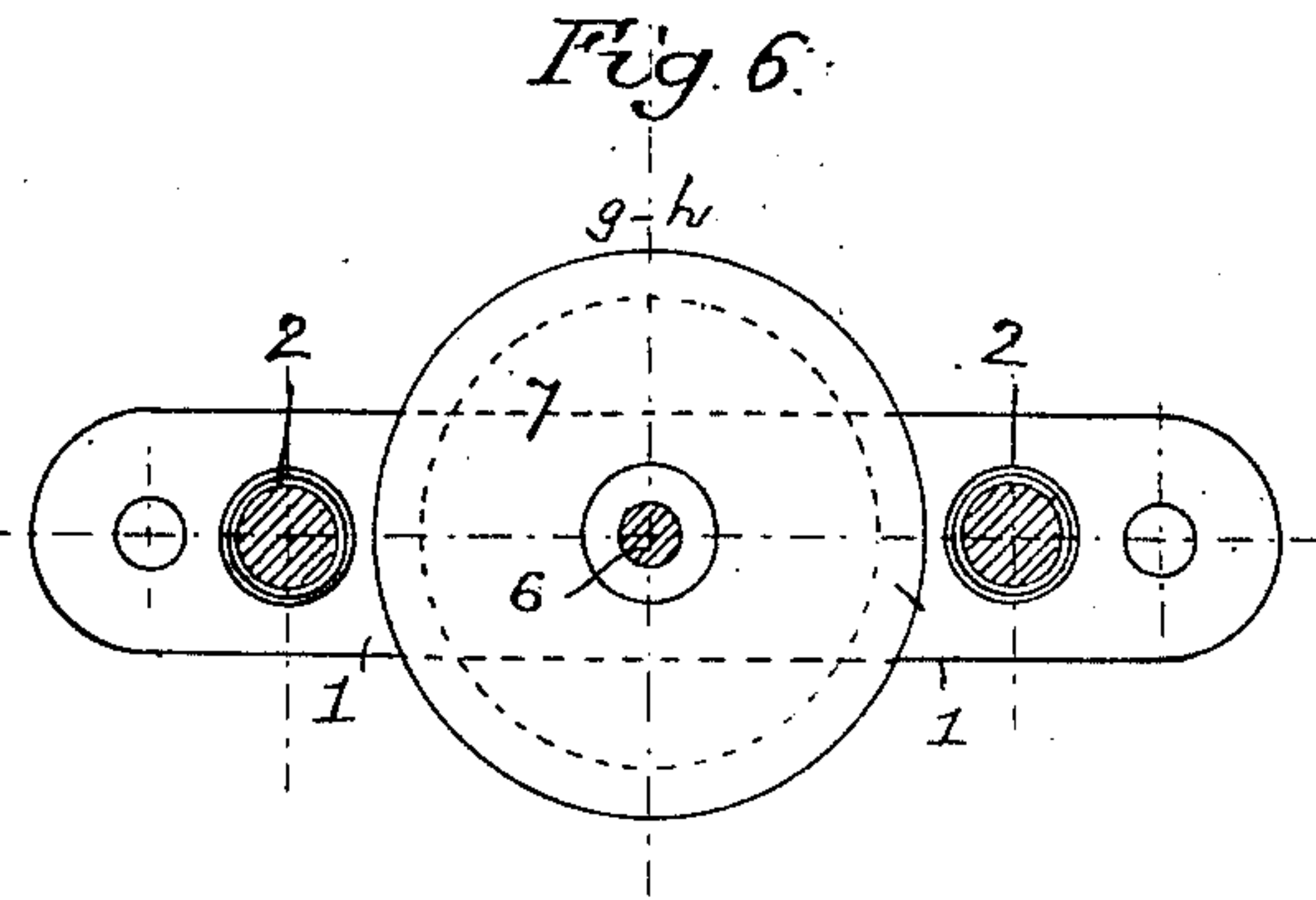


Fig. 5.

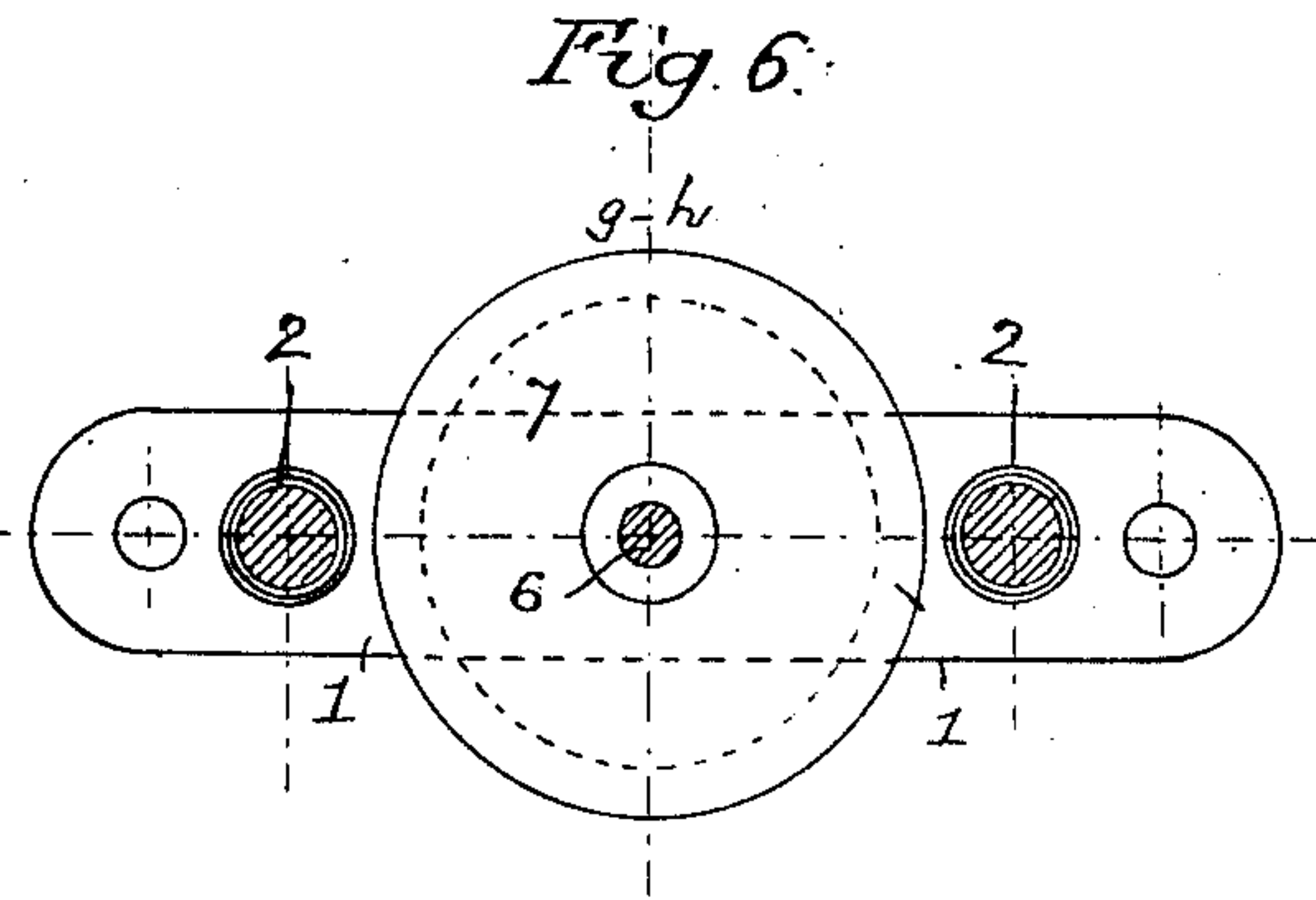


Fig. 6.

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Itus H. Lons.  
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# UNITED STATES PATENT OFFICE.

NILS H. O. LILIENBERG, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO BRADLEY STOUGHTON, OF NEW HAVEN, CONNECTICUT.

## INGOT-CASTING MACHINE.

No. 839,861.

Specification of Letters Patent.

Patented Jan. 1, 1907.

Application filed March 14, 1904. Serial No. 198,038.

*To all whom it may concern:*

Be it known that I, NILS H. O. LILIENBERG, a subject of the King of Sweden, residing in Philadelphia, Pennsylvania, have invented certain improvements in Ingot-Casting Machines, of which the following is a specification.

My invention relates to that class of ingot-casting machines in which the molten metal is cast in a revolving mold, the object of my invention being to provide a simple and efficient casting apparatus of this character in which relatively small ingots can be readily produced and in which the character of the ingot can be varied by varying the speed of rotation of the mold.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of an ingot-casting mold constructed in accordance with my invention. Fig. 2 is a transverse section of the same on the line *x x*; and Figs. 3, 4, 5, and 6 are respectively sectional plans on the lines *a b*, *c d*, *e f*, and *g h*, Fig. 2.

The machine constituting the subject of my present invention has a rigid base or foundation 1, from which rise two vertical posts or columns 2 2, rigidly connected and braced by suitable transverse bars 3 and 4 and also stayed, if desired, by bars 5, leading to any adjacent fixed structure.

The cross-bar 3 is provided with a bearing for a vertical shaft 6, which is likewise adapted to a suitable step-bearing in the base or foundation bar 1 of the structure, this shaft being provided with a grooved pulley 7 or other suitable means whereby it may receive power in order to impart to it any desired speed of rotation. The upper end of the shaft 6 carries a head 8, provided with projecting lugs 9, which are adapted to engage with lugs 10 on the bottom of the mold 11, the latter being thereby supported vertically upon the head 8 and caused to rotate therewith.

The vertical posts or columns 2 serve as guides for a sliding cross-head 12, to which vertical reciprocating movement can be imparted by means of a forked lever or pair of levers 13, hung to a rod 14, which is secured to or forms part of the lower one of a pair of bars 15 and 16, the upper one of which is secured to and depends from the top cross-bar 4 of the rigid frame. Each bar is provided with a series of openings 17 for the reception

of bolts 18, whereby the bar 15 can be adjusted vertically on the bar 16, so as to provide for the use of molds 11 of different heights. The sliding cross-head 12 is adapted to bear upon the cap 19 of the mold 11, which cap has a depending portion or plug fitting with reasonable snugness to the interior of the mold. The rotation of the cap 19 with the mold may be insured by providing said mold with lugs 20, adapted to recesses in the cap or in any other suitable way.

Mounted upon the cross-head 12 is a hopper 21, which has a downwardly-projecting spout 22 passing through the cross-head and also through a central opening in the mold-cap 19, as shown in Fig. 2.

In the operation of the device the cross-head 12, with its hopper, is first raised so that the empty mold can be placed upon the head 8. The mold, with the cap 19 upon it, being properly located, the cross-head 12 is lowered until the projecting spout 22 of the hopper passes through the central opening of the mold-cap, as shown in Fig. 2, whereupon rotating movement is imparted to the mold by means of the shaft 6, and the molten metal is then poured into the mold through the hopper 21 and its spout 22, the effect of the centrifugal action being to cause the metal to seek the walls of the mold and rise thereon to an extent which is dependent upon the speed of rotation of the mold. Thus a relatively low rate of speed will result in the formation of a cup-shaped ingot whose raised side portions ascend the walls of the mold to a greater or less extent, while a relatively high rate of speed will cause all of the metal to seek the walls of the mold and will result in the production of a hollow or tubular ingot, as shown in Fig. 2. As soon as the ingot is sufficiently set to retain the shape which has been imparted to it, the rotation of the shaft 6 is arrested, the cross-head 12 is raised, the mold 11 is removed, an empty mold is inserted in its place, the cross-head 12 is again lowered, and the operations before described are repeated.

An ingot-casting apparatus of the character described provides for the rapid and effective formation of ingots of relatively small size, a single set of operating and rotating devices being available for use in connection with any desired number of molds. It will be noted that an ingot-casting device such as



that constituting the subject of my invention is essentially distinct from that class of rotating molds in which a core is employed, my mold being coreless and the tubular form of the ingot being due entirely to the centrifugal action of the rotating mold. It is not necessary, therefore, in using my improved mold to employ a measured quantity of metal for each ingot, since variation in the quantity of metal provided for each cast can only result in varying the thickness of the ingot, and such variation within wide limits is possible because of the absence of a core or other restraining influence.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination in ingot-casting apparatus, of a coreless upright mold having a detachable cap in engagement with it but free from vertical confinement thereto, said cap having a central opening and means independent of the mold for confining it in position, with means for rotating said mold, substantially as specified.

2. The combination, in ingot-casting apparatus, of a fixed frame having upright posts or columns, a rotatable vertical shaft having a mold detachably mounted thereon, a cross-head vertically guided on said posts or columns, a hopper mounted upon said cross-head and having a mold-filling spout, and

means for raising and lowering the said cross-head on its guides, substantially as specified.

3. The combination, in ingot-casting apparatus, of a fixed frame, having upright posts or columns, a rotatable vertical shaft, a mold detachably mounted thereon, a cross-head vertically guided on said posts or columns, a hopper carried by said cross-head, and having a depending mold-filling spout, and a lever engaging said cross-head, and having a vertically-adjustable pivot or fulcrum, substantially as specified.

4. The combination, in ingot-casting apparatus, of a fixed frame, having vertical posts or columns, a rotatable vertical shaft, a mold detachably mounted thereon, a cross-head guided on said posts or columns, a hopper mounted upon said cross-head, and having a depending mold-filling spout, a lever engaging said cross-head, and a pair of bars vertically adjustable one upon the other, one of said bars depending from the fixed structure and the other carrying the fulcrum of the lever, substantially as specified.

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

NILS H. O. LILIENBERG.

Witnesses:

JAMES McMORRIS,  
JOS. H. KLEIN.