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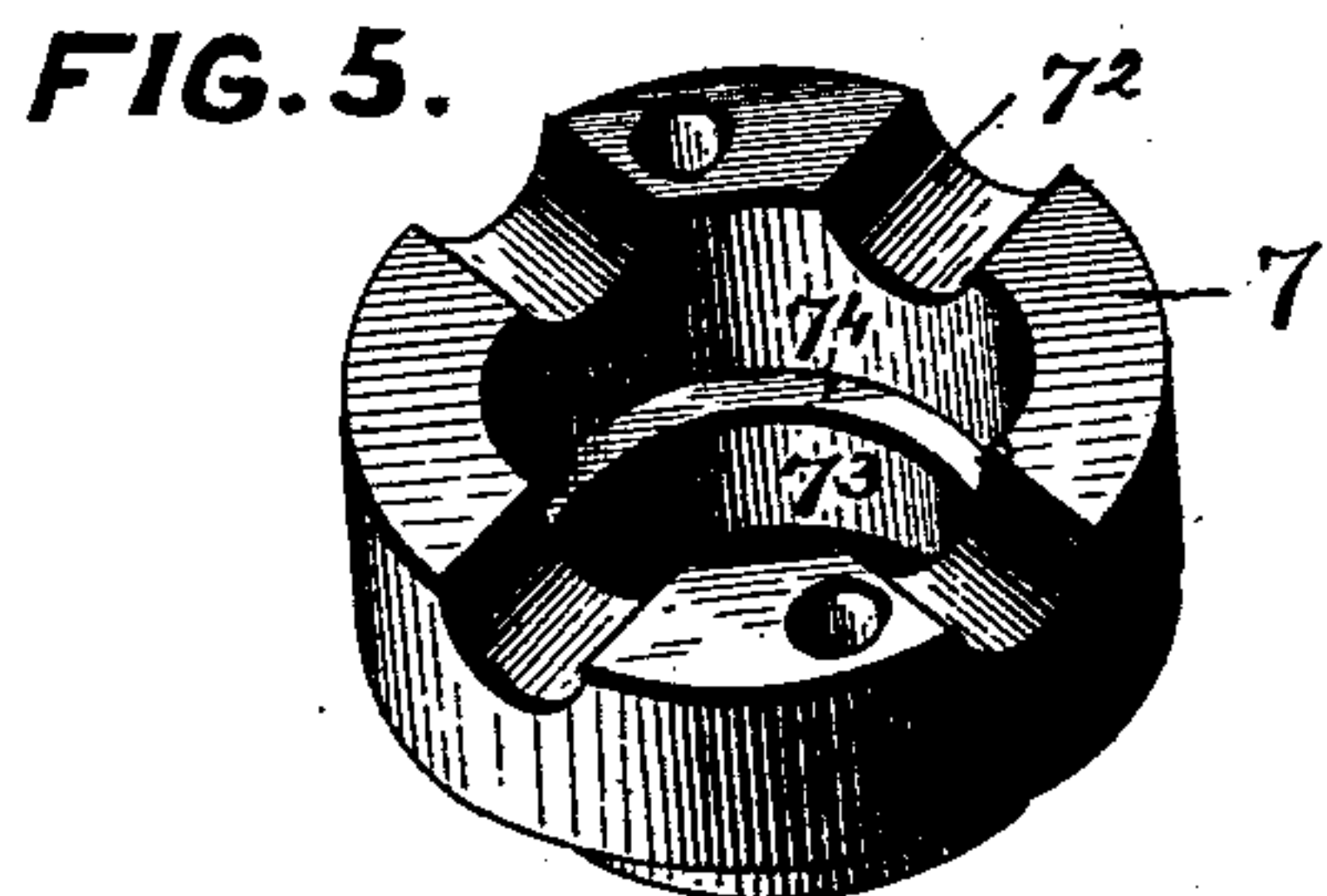
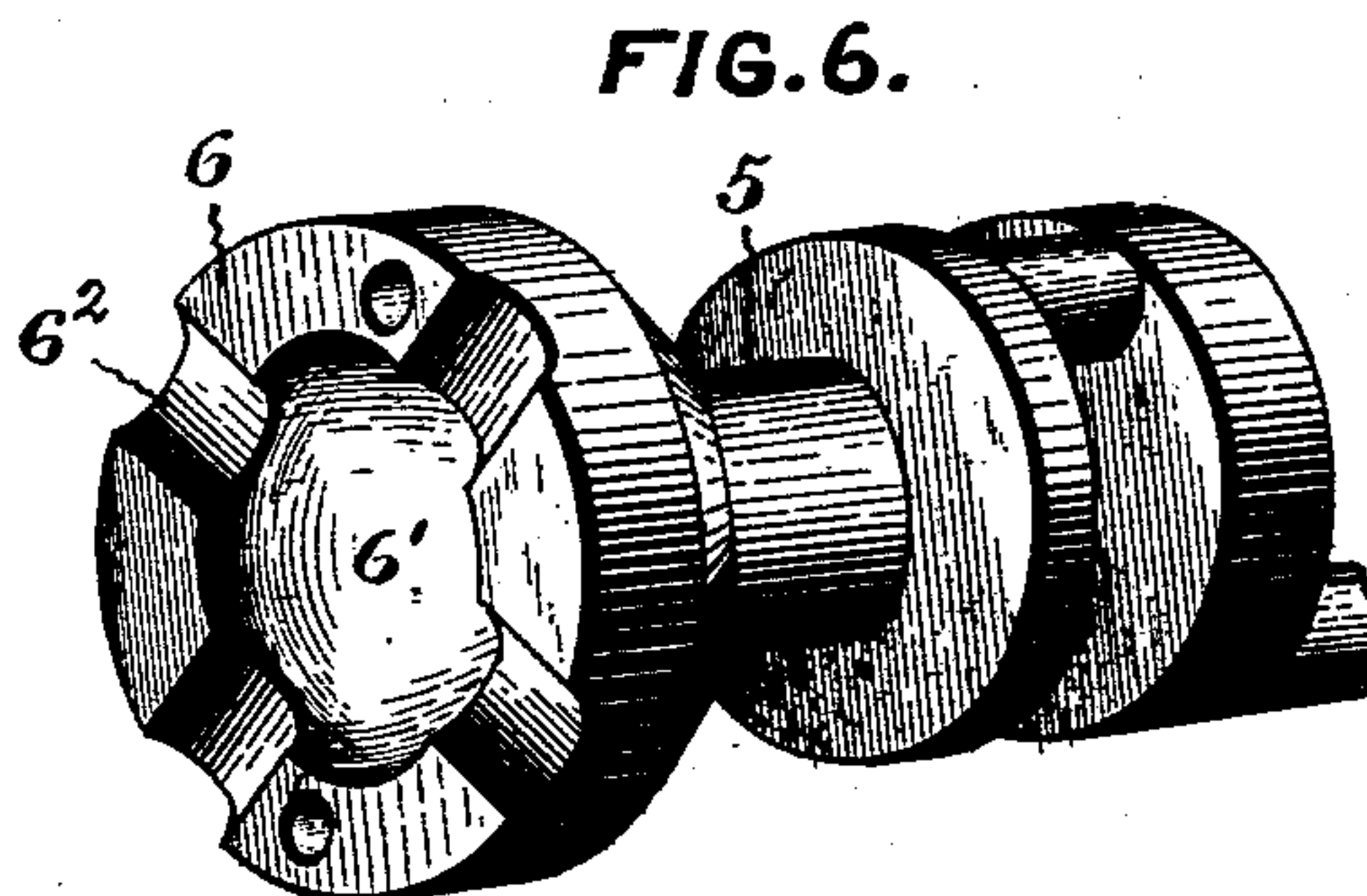
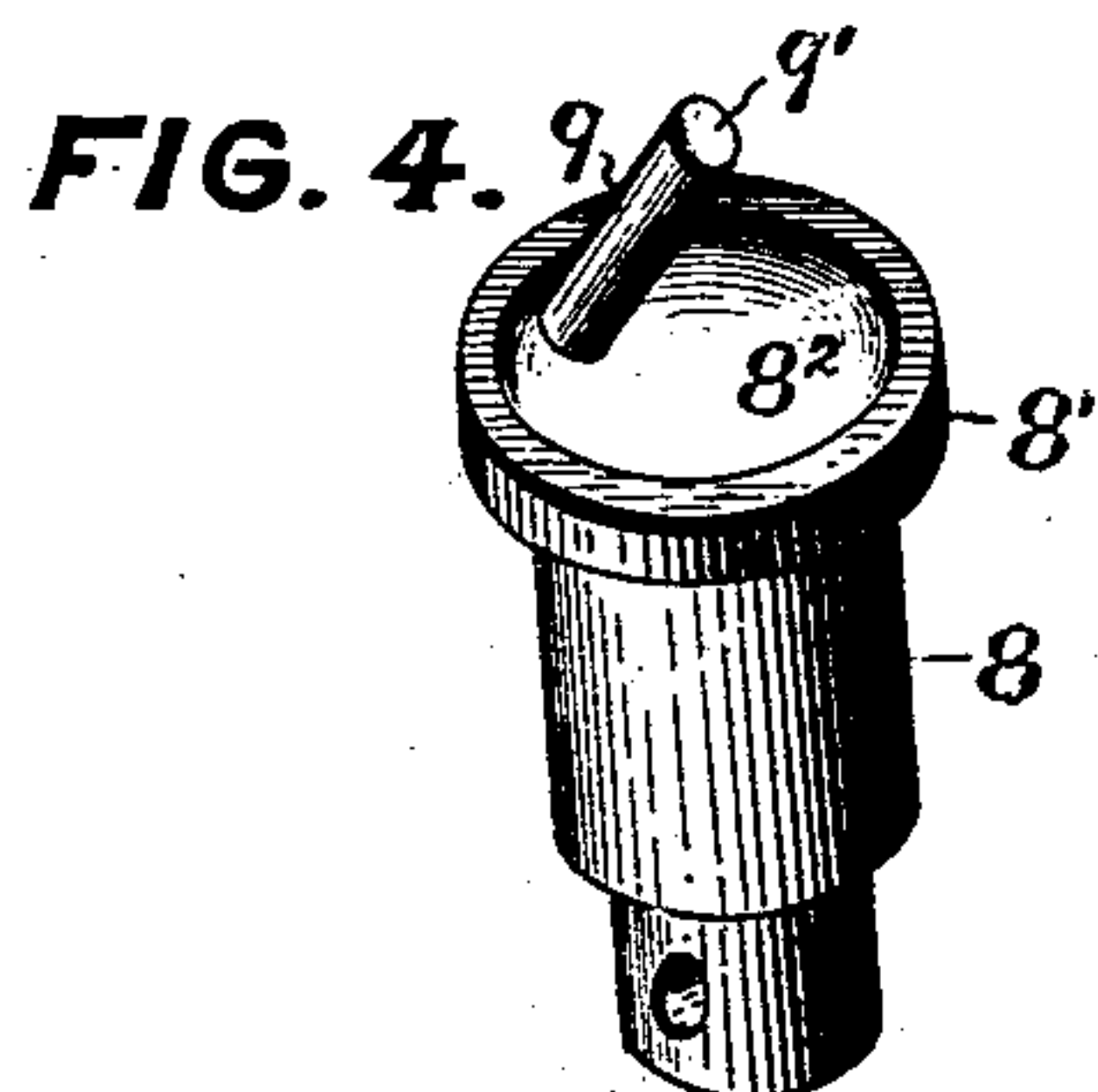
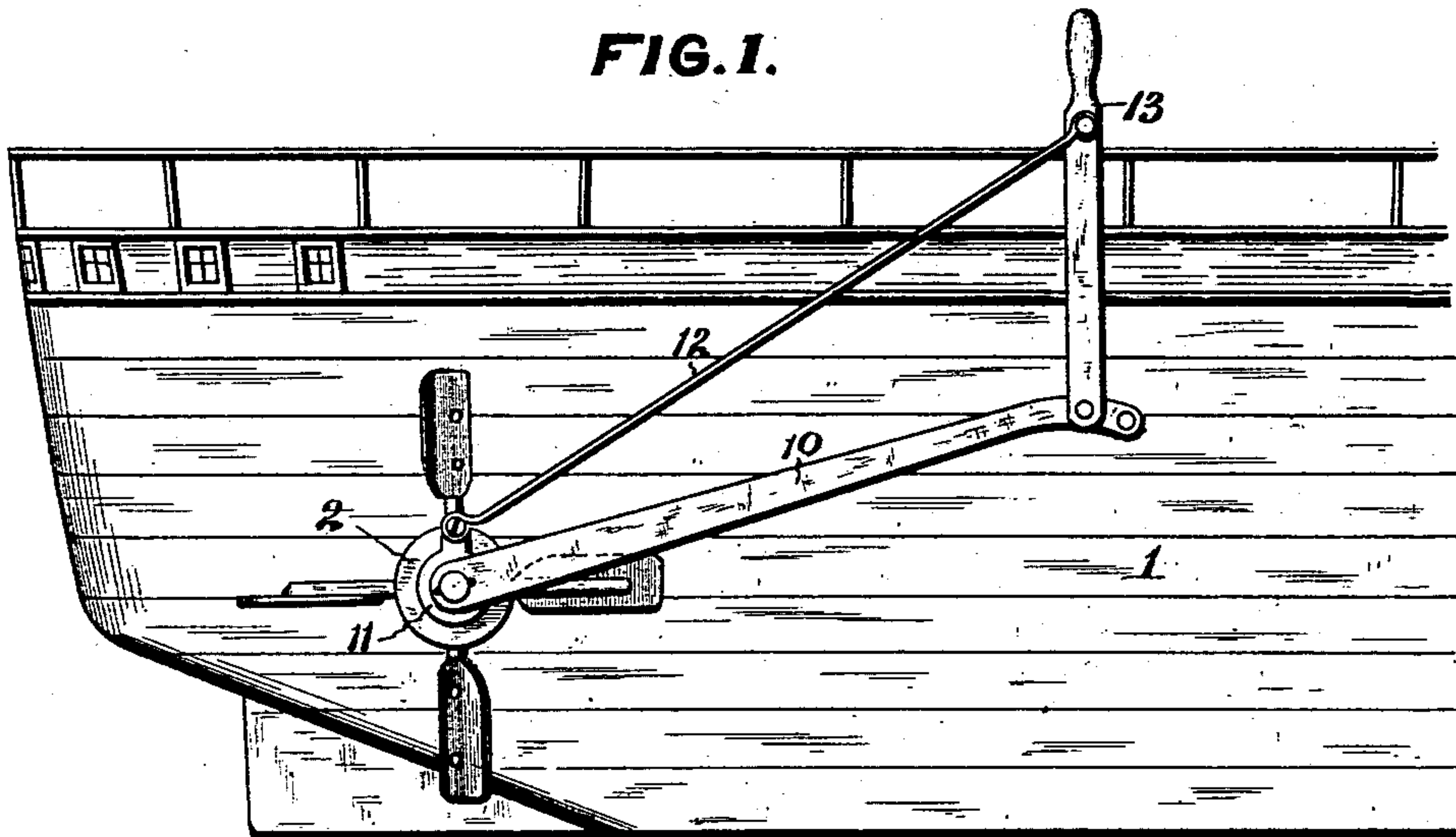
2 Sheets—Sheet 1.

J. J. WATERS.
MECHANICAL MOVEMENT.

No. 570,578.

Patented Nov. 3, 1896.

FIG. 1.



WITNESSES
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Marie Wilson

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(No Model.)

2 Sheets—Sheet 2.

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FIG. 2.

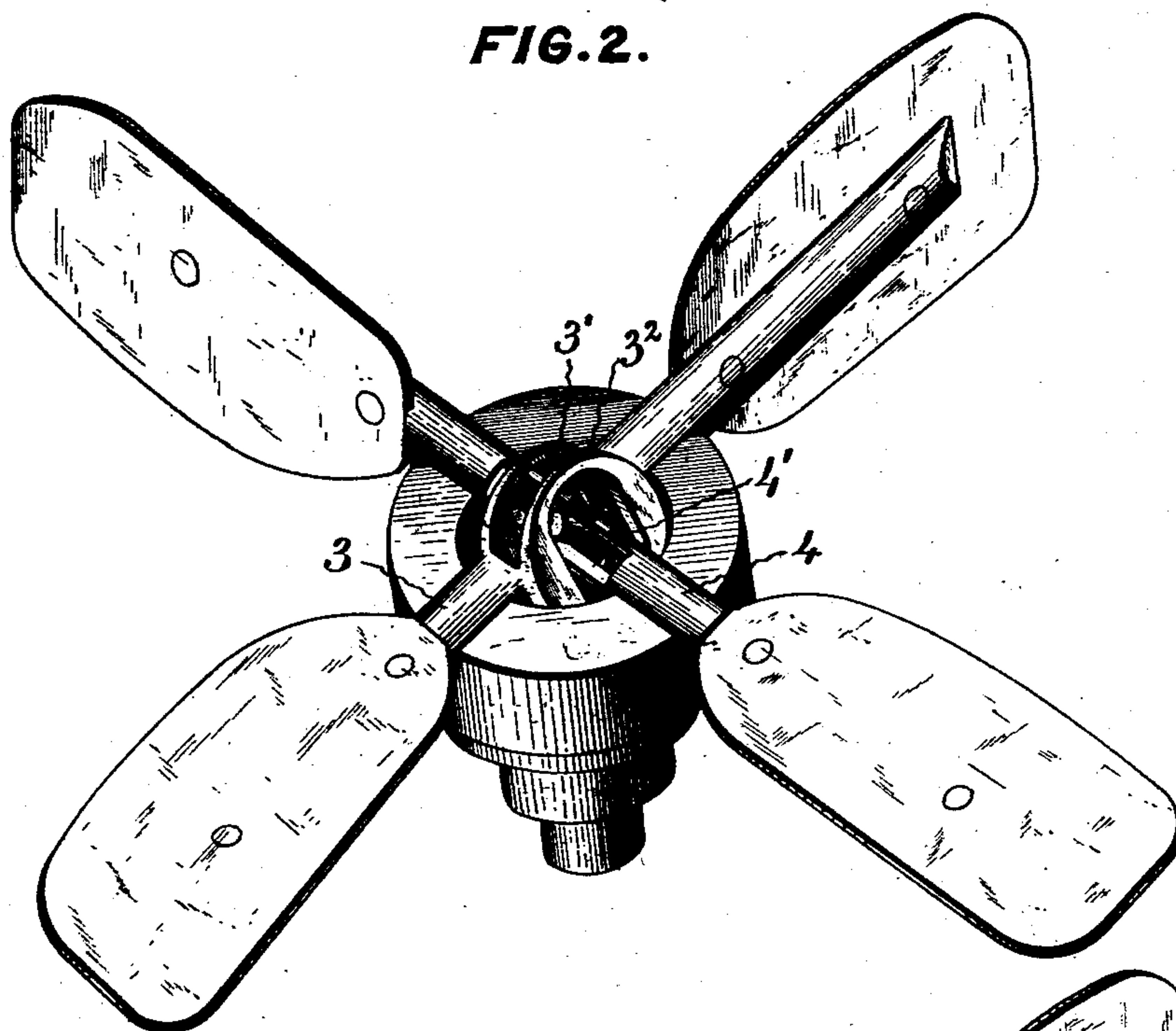
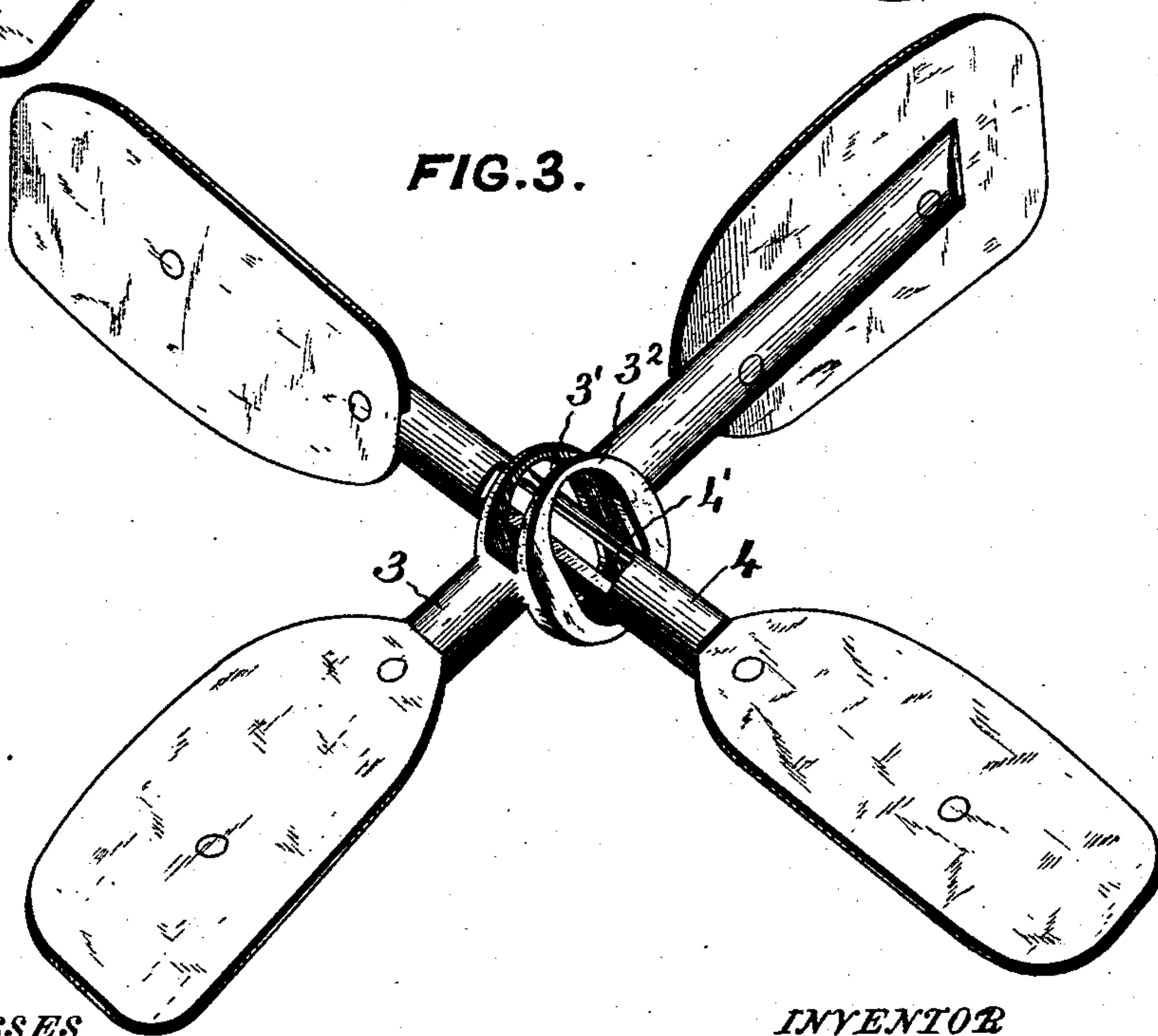


FIG. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN J. WATERS, OF SAGINAW, MICHIGAN, ASSIGNOR OF ONE-HALF TO
E. J. FITZHARRIS, OF SAME PLACE.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 570,578, dated November 3, 1896.

Application filed July 10, 1895. Serial No. 555,497. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. WATERS, a citizen of the United States, residing at Saginaw, in the county of Saginaw and State of Michigan, have invented certain new and useful Improvements in Mechanical Movements; and I do hereby declare the following to be 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.

My invention relates to improvements in mechanical movements, and particularly to improvements in that class thereof which is designed to permit the transformation of a rotary movement into a movement of a different type; and it consists of an improved mechanism for transforming a rotary movement into either an oscillatory movement, or a combined oscillatory and rotary movement, which will be hereinafter fully described, and particularly pointed out in the claims. A combined oscillatory and rotary movement can be used in connection with many different types and kinds of mechanism. It can be used, for example, in operating a valve-gear for a steam-engine, as well as for feathering the blades of a propeller-wheel, so great and varied is the need for such a movement. Means which have hitherto been employed to produce this movement have, however, been complicated, expensive, and wasteful of energy.

The object of my present invention is to provide a simple and inexpensive means for producing this movement which will operate with a minimum amount of frictional loss, and which will successfully produce the movement under varying conditions of power and speed.

A further object of my invention is to so adapt the means used to produce a combined oscillatory and rotary movement by a transformation from a simple rotary movement that not only will the combined oscillatory and rotary movement be available, but also, and by the use of the same mechanism, a simple oscillatory movement.

In accomplishing the object of my invention I form slots in the castings, arms, shafts, rods, &c., to which the oscillatory movement

is to be imparted, and place the same in such relation to the face of a body from which a centrally-inclined pin projects that the pin passes through the slots in the shafts, &c., and give to one of the parts a rotary movement. If a rotary movement be given to the body on which the centrally-inclined pin is formed, the connection described will result in oscillating the slotted shaft. This oscillatory movement will occur twice during each complete revolution of the body, as during each half-revolution of the same the pin bears against the slot in the rod in a complete cycle of differently-inclined directions. If, however, the shaft be given a rotary movement with relation to the body having the centrally-inclined pin projecting from one face thereof, and the body be held stationary, the shaft will have not only the rotary movement imparted to it by the power element, but also the oscillatory movement imparted to it by the action of the pin passing through the slot in the same, so that in this case a combined oscillatory and rotary movement is imparted to the shaft. This movement is of a very simple character and will take place with slight frictional loss of power.

In some cases, as in feathering the blades of a propeller-wheel, it is necessary to impart the combined oscillatory rotary movement to more than one shaft. I accomplish this with my movement by forming slots in all of the rods or shafts to be operated and placing all of these rods or shafts at the desired angle to each other in such relation to the end of the body having a centrally-inclined pin projecting therefrom that the said pin will pass through the slots in all of the shafts. It is necessary, of course, in order that this may be accomplished, that portions of the slots in all of the rods or shafts lie in the same plane, namely, the plane of the centrally-inclined pin.

Preferably, when only two shafts arranged at a desired angle to each other are to be operated, I form one of said shafts with a hollow rounded portion and form the slot in the said shaft in this portion thereof. I then pass through the hollow of the shaft the second shaft to be operated and hold both shafts, with their slots, one above the other in a suit-

able casting, in which an aperture at right angles to the directions of the shafts to be operated is formed. Into this aperture I place the body upon whose face is formed the centrally-inclined pin, spherically chambering the end of said body, so that it will form a good bearing-surface for the rounded portion of one of the shafts. The pin on this body is passed through the slots of both of the shafts to be operated and imparts to the same, as they are rotated by the power element, an oscillating movement. The oscillatory movement of the two shafts does not take place at the same time, but alternately one after the other, so that, since in each case the oscillation occurs twice during a single revolution, a quartered movement is given to the shafts especially adapted for use on a four-blade feathering propeller-wheel. This is the construction which I show in the drawings accompanying this application, and is the one best suited for embodying my invention, though I do not limit myself thereto.

My invention is fully illustrated in the drawings which accompany and form a part of this application, in which a four-blade feathering propeller-wheel is shown constructed so that my improvement may be used in connection therewith.

In the drawings, in which the same reference-numerals refer to the same or corresponding parts, Figure 1 is a view of the stern of a vessel having a four-blade feathering propeller-wheel in position thereon. Fig. 2 is a view showing the crossed slotted shafts of the propeller-wheel in their relation to the centrally-inclined pin formed on the end of the casting shown in Fig. 4. Fig. 3 is a detail perspective view of the slotted crossed propeller-shafts, showing the arrangement of the same. Fig. 4 is a view of the body having a centrally-inclined pin formed on the face thereof, showing the spherical chambering of the face thereof. Fig. 5 is a detail view of one of the castings used to hold the feathering-blades in position on the vessel. Fig. 6 is a view of the end of the power-shaft, showing the enlarged and chambered end of the same.

Referring to the drawings, 1 represents the vessel, on which is held the propeller-wheel 2. The propeller-wheel in this case is formed with four propeller-blades placed securely on the ends of the crossed shafts 3 and 4. These shafts are held firmly in position on the enlarged and chambered end 6 of the power-shaft 5 by the casting 7. The power-shaft is operated by some suitable connection (not shown) with the motive power of the vessel. The crossed propeller-shafts are both formed with slots 3' and 4'. The central portion of the shaft 3 is rounded, as shown at 3². This rounded portion is hollowed to permit the passage therethrough of the shaft 4. The slot 3' occurs on the rounded portion of the shaft 3, so that when the shafts are arranged in position the slots therein lie directly over

each other and portions of the same are in a common plane. To provide for the reception of the rounded portion of the shaft 3, the end 6 of the power-shaft 5 is spherically chambered, as shown at 6'. A suitable bearing-face is also formed in the casting 7, so that a free oscillatory movement of the shaft 3 upon the end of the power-shaft is permitted. Both the end 6 of the power-shaft and the casting 7 are formed with semicircular grooves 6² and 7², respectively, which are placed at right angles to each other, so that the shafts, when in position, will be held not only on the end of the power-shaft, but at the proper angle to each other.

An aperture 7³ is formed in the casting 7 at right angles to the direction of the grooves 7², formed therein. Into this aperture is placed a short shaft 8, which is formed with a shouldered portion 8' to enable the shaft to rest securely in position in the casting 7 against the peripheral flange 7⁴, formed thereon, and the outer end of which is spherically chambered, as shown at 8². From the end of this shaft, and near the periphery of the same, projects the pin 9, which is centrally inclined and is of such a length that its end 9' lies in the plane of the center.

When the parts are assembled, the pin 9 passes through the slots 3' and 4' of the crossed shafts 3 and 4, so that it imparts to the same, in a manner which will be presently described, an oscillatory movement.

The shaft 8 is held in position on the side of the vessel by a support 10. Upon this shaft is mounted a collar 11, keyed thereto, to which is connected the rod 12. This rod is attached to the pivoted handle 13.

The operation of my movement is as follows: From the construction described it will be apparent that the shafts 3 and 4, while held firmly in position on the end of the power-shaft by the mechanism shown, are further so held as to permit them to be given an oscillatory as well as rotary movement, that is to say, they are held in such a manner as to permit them to be rotated on their axes, were it not for the fact that the pin 9 projects through the slots formed in the same. When the power-shaft is rotated, the propeller-shafts will of course have a corresponding rotary movement. They will also, however, because of the fact that the pin 9 presses with a force which is constantly changing its direction against the sides of the slots formed in the propeller-shafts, as the shafts rotate with relation to the pin, receive an oscillatory movement, so that the blades will be feathered as they make their revolution. This oscillatory movement will occur twice during a complete revolution, and as the two propeller-shafts are set at right angles to each other the feathering of the blades is so arranged that it occurs when the blades are passing through the upper part of their movement. Through the action of the pin 9 each blade is oscillated, so that as it approaches

the center of its upper movement it is turned in such a manner that it presents a cutting edge to the water, and so that, as it recedes from this portion of its movement, it is turned to present a broad bearing-face against the water. In this manner the propeller-wheel operates under the most favorable conditions for the exercise of great power with a given expenditure of force, and for the attainment of high speed.

It is apparent that the point at which the oscillation of the propeller-blades takes place depends upon the relation which the centrally-inclined pin 9 bears to the slot in the shafts bearing the same. In order to enable the propeller-blades to be set so as to feather at the desired moment, I therefore provide means through the pivoted handle 13 and connecting-rod 12 to vary the position of the centrally-inclined pin 9. In this manner I am able to make the feathering of the blades perfectly uniform and to secure the operation of the propeller-wheel under the most desirable conditions.

While I have described my invention in connection with a propeller-wheel, I do not limit myself to its use in such connection, but may use it in any manner in which the operation described is advantageous.

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

1. The combination with a revoluble body, having an inclined pin formed on one face thereof, of a revoluble body having a slot formed therein, supported over said face, with the pin passing through the slot thereof, and means for supporting said slotted body so as to permit it to have an axial movement, whereby revolution of said slotted body results in the same having an oscillatory as well as a rotary motion, substantially as described.

2. The combination with a revoluble body having an inclined pin formed on one face thereof, of a plurality of revoluble bodies, arranged at right angles to each other and so as to have independent movement, supported over said face with the pins passing through the slots thereof, whereby revolution of said slotted bodies results in the same having independent oscillatory movements as well as a rotary motion, substantially as described.

3. The combination with a body having an inclined pin formed on one face thereof, of a plurality of revoluble slotted bodies arranged so that some portion of all of their slotted

portions come in the plane of the pin, supported over said face with the pin passing through the slots thereof, whereby revolution of said slotted bodies results in their having independent oscillatory movements as well as a rotary motion, substantially as described.

4. The combination with a body having a spherically-chambered face with an inclined pin formed thereon, of a revoluble shaft having a slotted rounded hollow portion, a second revoluble slotted shaft placed through said hollow portion, both shafts being arranged with the pin passing through the slots thereof, whereby revolution of said shafts results in their having independent oscillatory movements as well as a rotary motion, substantially as described.

5. The combination with a casting having an aperture formed therein, and a revoluble slotted shaft supported transversely of said aperture, of a shaft, having a centrally-inclined pin formed on the end thereof, stationed in said aperture, the pin passing through the slot in the shaft, whereby rotation of said slotted shaft results in the same having an oscillatory as well as a rotary motion, substantially as described.

6. The combination with a casting having an aperture formed therein, and a plurality of slotted shafts supported thereby transversely of said aperture, a portion of all of said slotted portions being in one plane, of a revoluble shaft having a centrally-inclined pin formed on one end thereof stationed in said aperture, the pin passing through the slots in the shafts, whereby revolution of said slotted shafts results in their having independent oscillatory movements as well as a rotary movement, substantially as described.

7. The combination with a casting having an aperture formed therein, and a plurality of slotted shafts revolubly supported in said casting at an angle to each other, of a shaft having a centrally-inclined pin formed on one face thereof stationed in said aperture, the pin being passed through the slots in the different shafts, whereby revolution of said slotted shafts results in their having independent oscillatory movements as well as a rotary movement, substantially as described.

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

JOHN J. WATERS.

Witnesses:

JOHN W. RICHARDSON,
JULIUS F. PITTMANN.