No. 706,779. Patented Aug. 12, 1902.

# J. PORRITT.

## THRUST BEARING.

(Application filed Apr. 12, 1901.

(No Model.) 4 Sheets—Sheet 1.

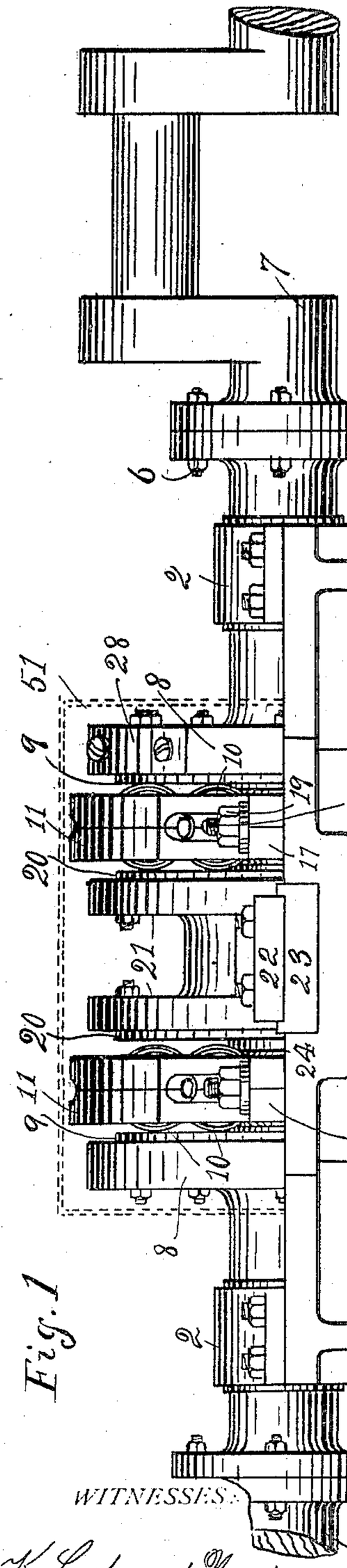

Fig. 1

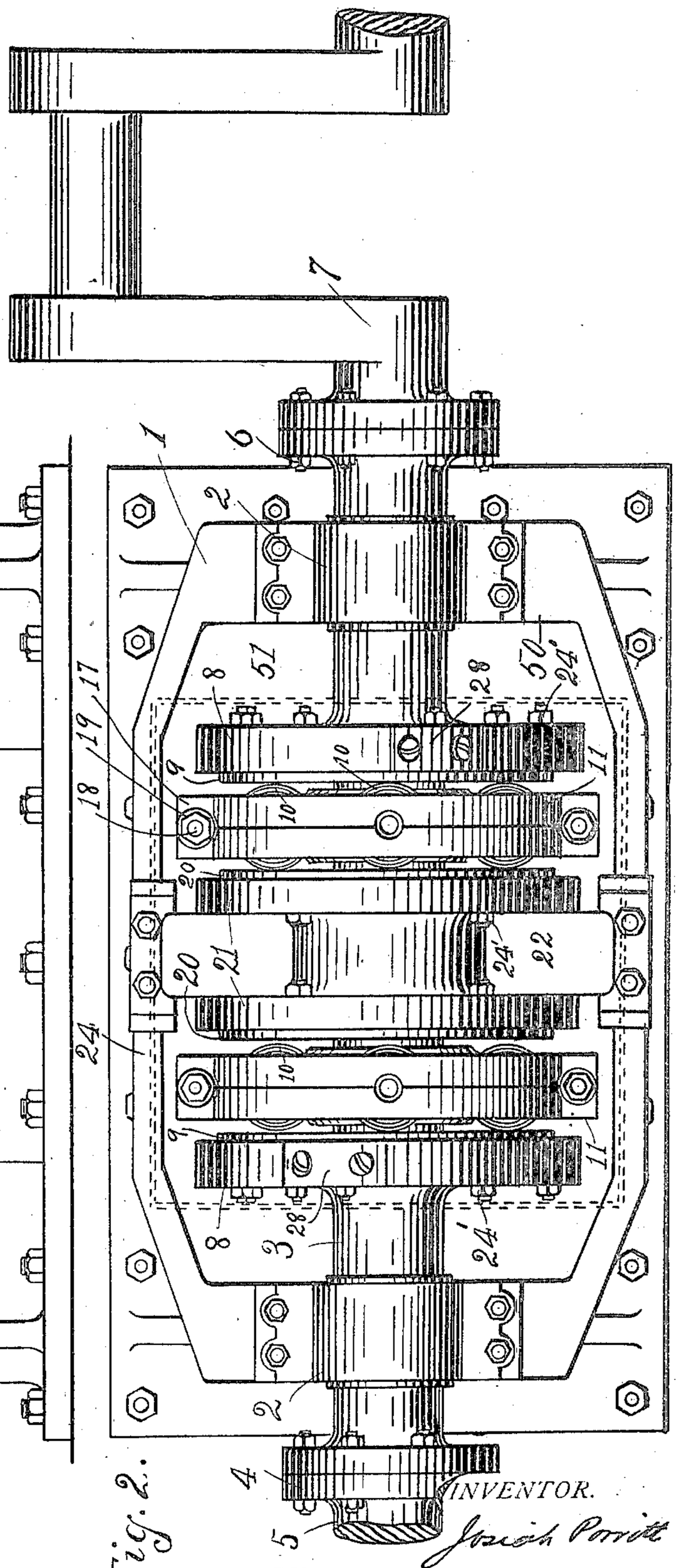

Fig. 2.

WITNESSES:

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## THRUST BEARING.

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(No Model.) 4 Sheets—Sheet 2.

Fig. 8.

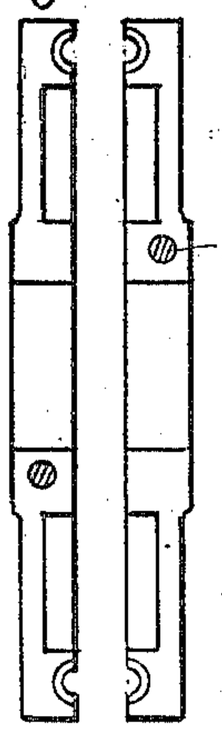



Fig. 3.

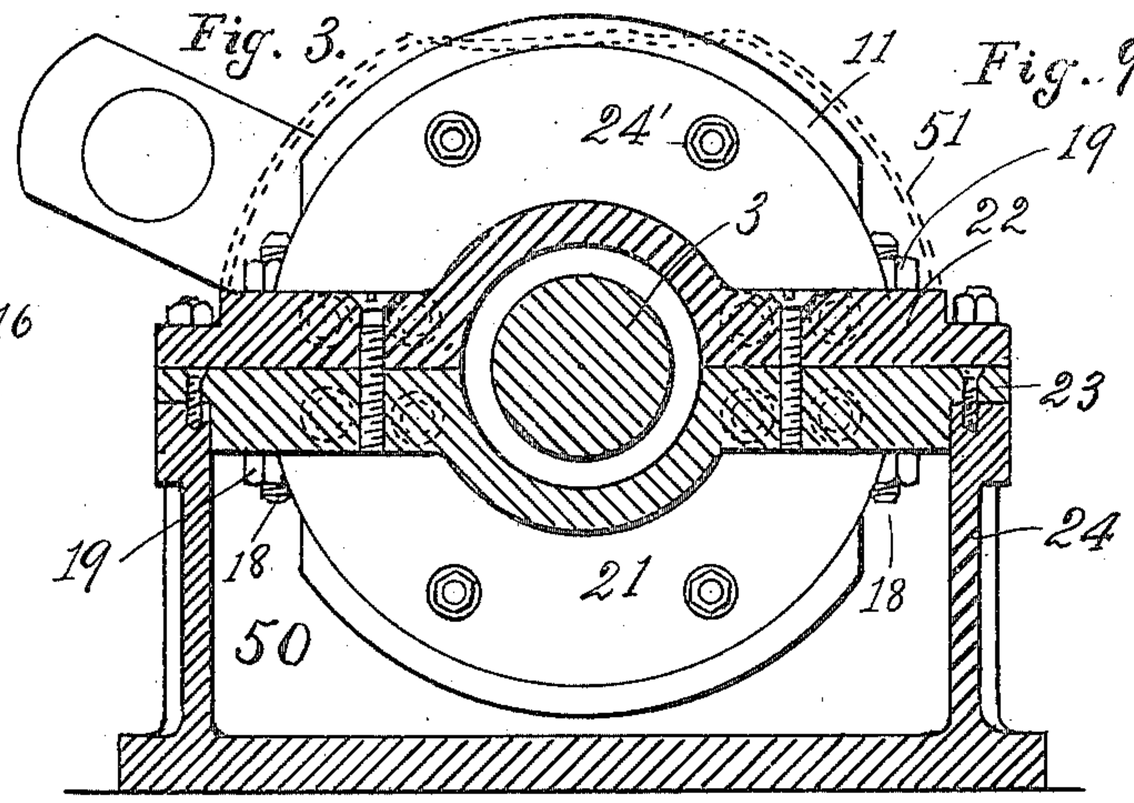



Fig. 9.

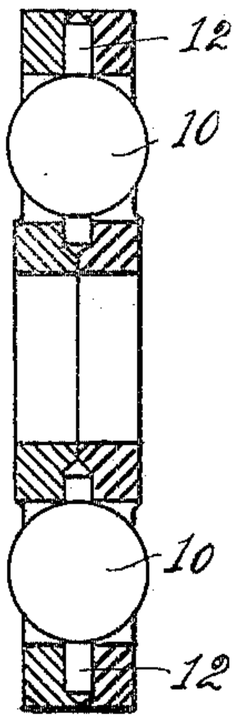



Fig. 4.

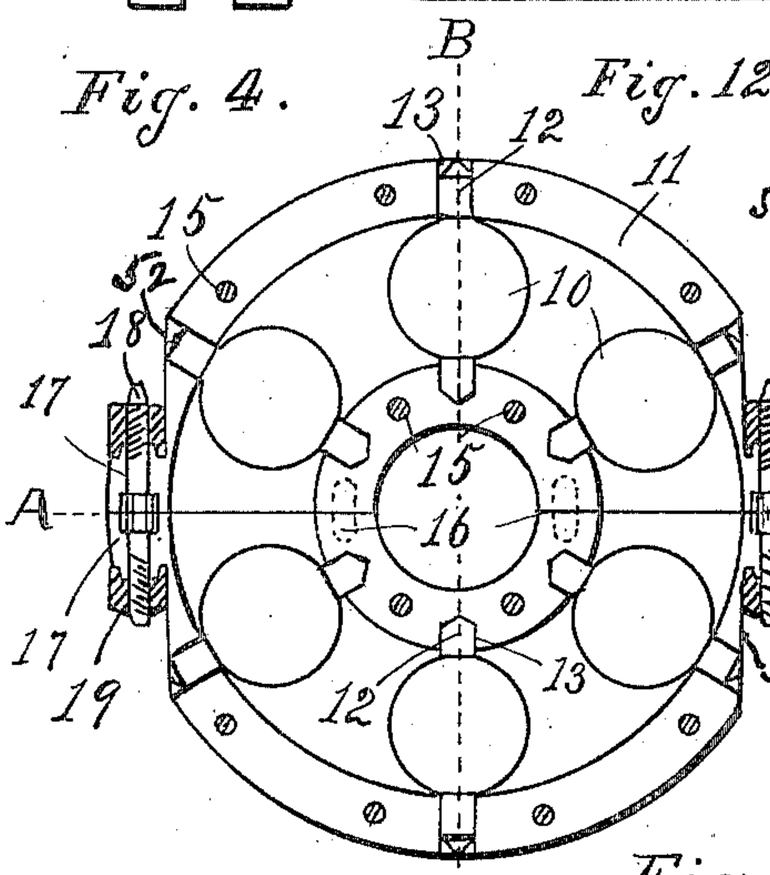



Fig. 12.

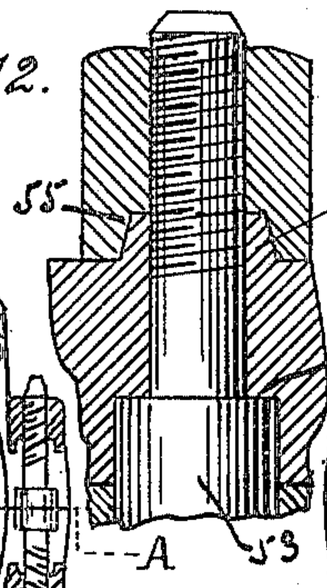



Fig. 5

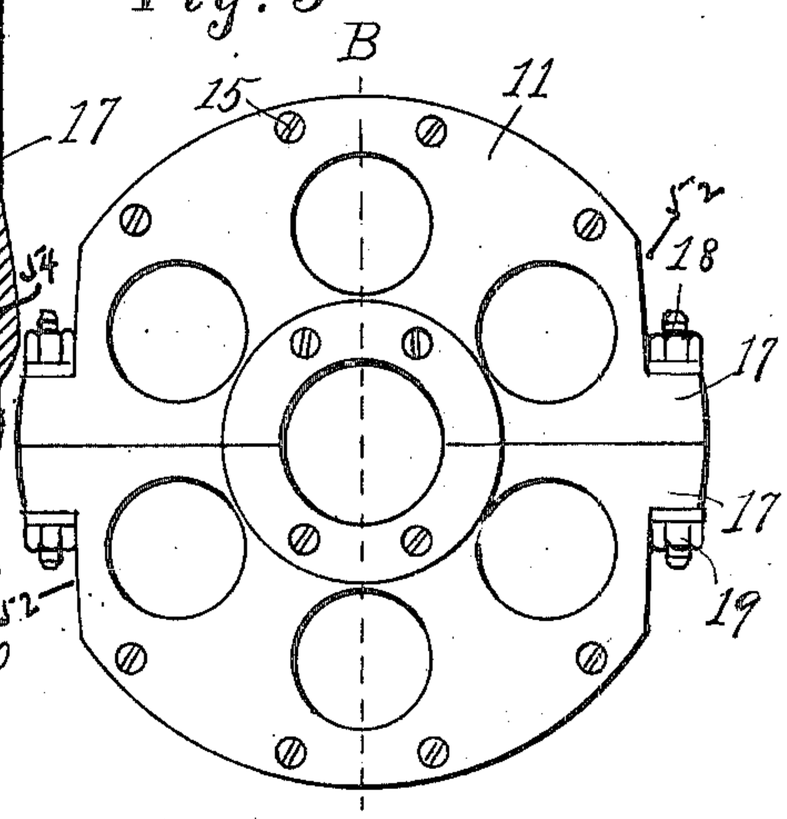



Fig. 10.

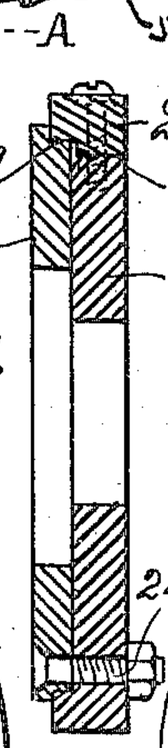



Fig. 6.

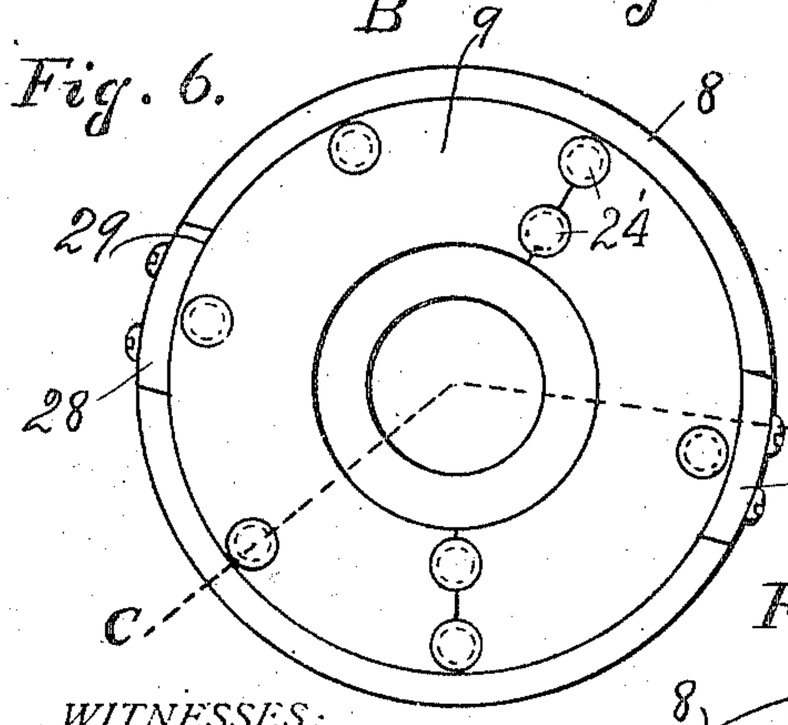



Fig. 7.

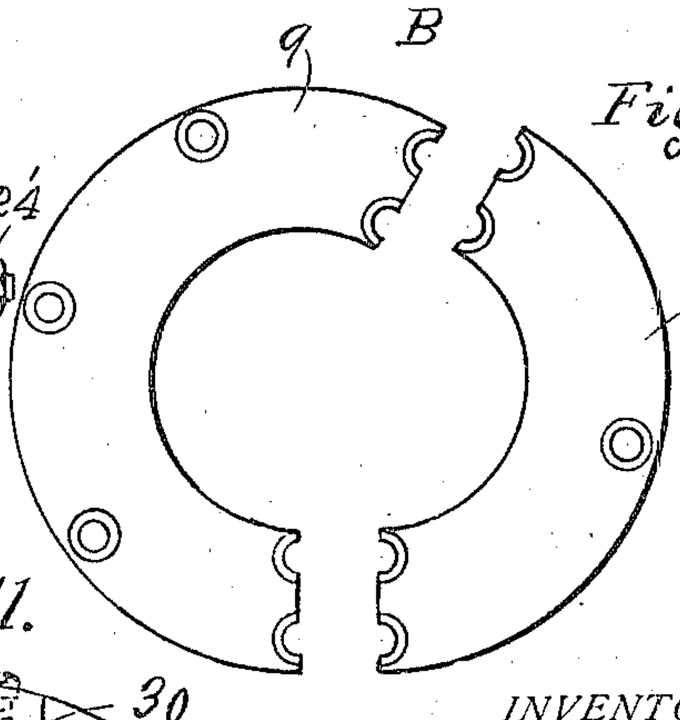
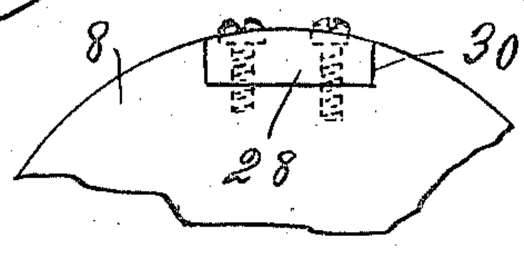



Fig. 11.




WITNESSES:

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# J. PORRITT.

## THRUST BEARING.

(Application filed Apr. 12, 1901.)

(No Model.) 4 Sheets—Sheet 3

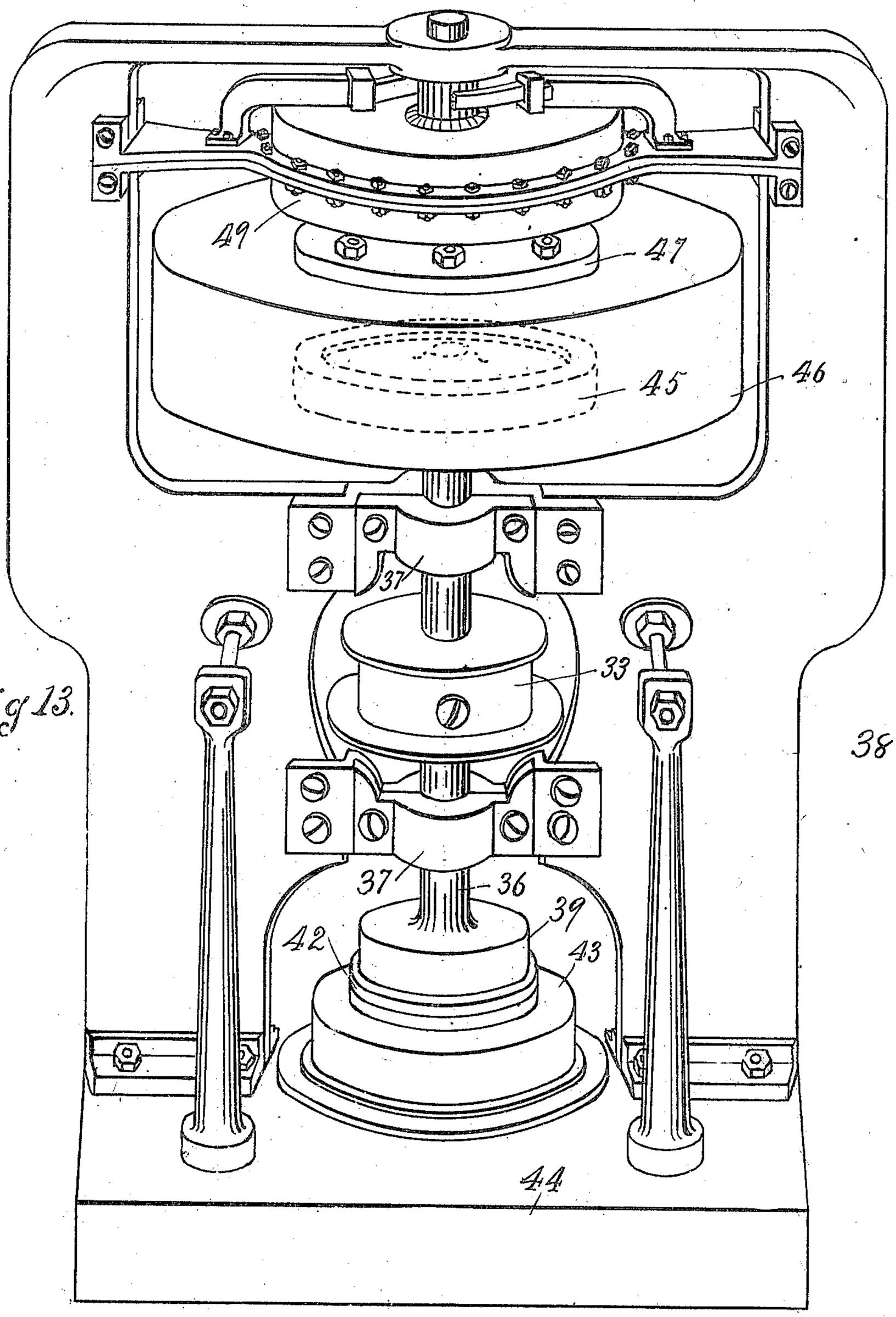


Fig 13.

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No. 706,779. Patented Aug. 12, 1902.

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## THRUST BEARING.

(Application filed Apr. 12, 1901.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 14.

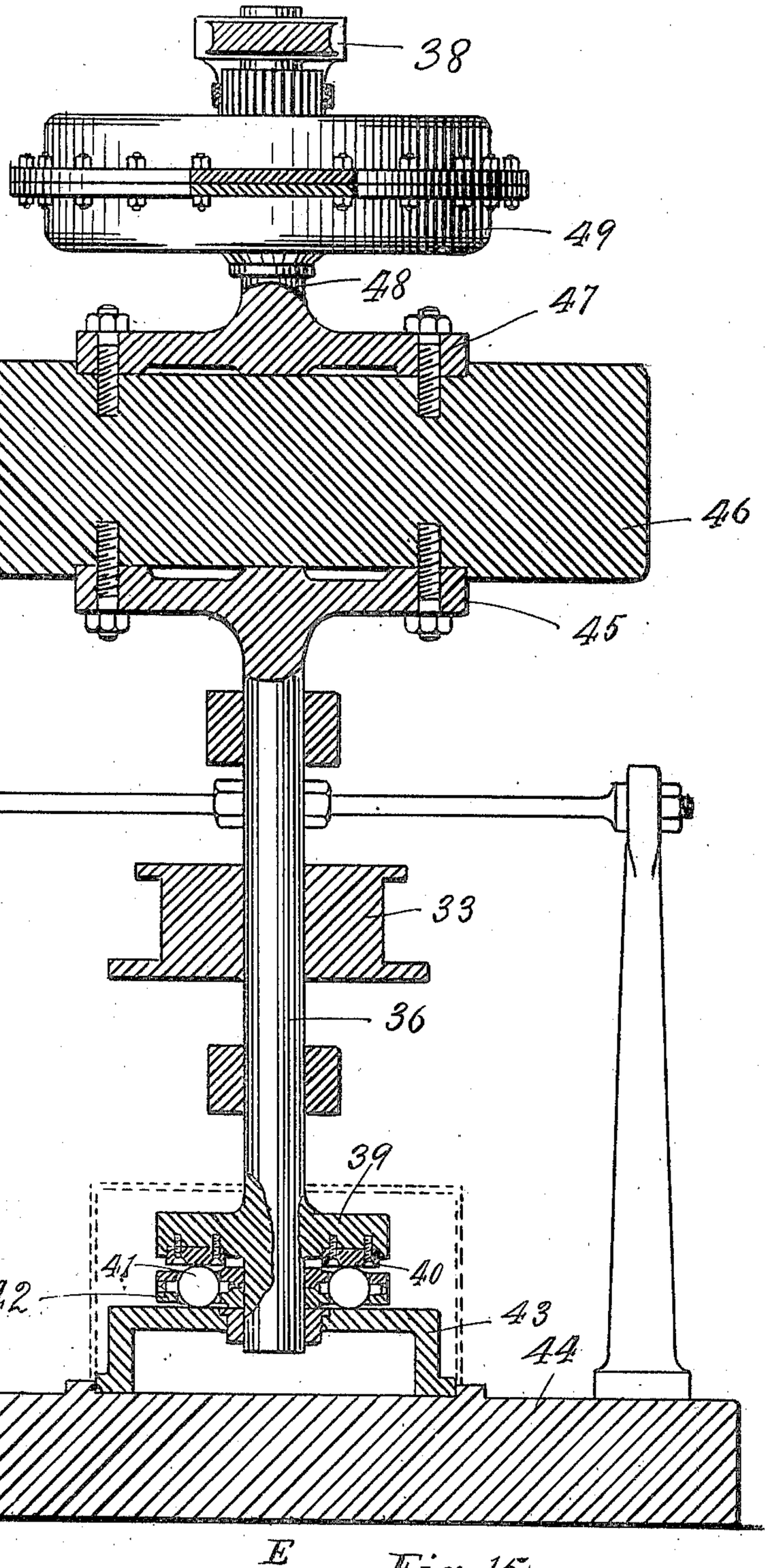



Fig. 16.

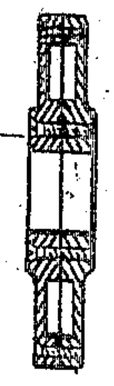
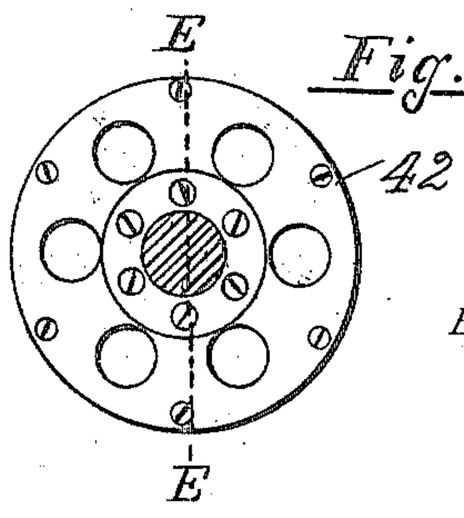



Fig. 15.




WITNESSES:

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# UNITED STATES PATENT OFFICE.

JOSIAH PORRITT, OF SAN FRANCISCO, CALIFORNIA.

## THRUST-BEARING.

SPECIFICATION forming part of Letters Patent No. 706,779, dated August 12, 1902.

Application filed April 12, 1901. Serial No. 55,574. (No model.)

*To all whom it may concern:*

Be it known that I, JOSIAH PORRITT, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Thrust-Bearings, of which the following is a specification.

My invention relates to improvements in thrust-bearings, the object of my invention being to provide means for reducing the friction and consequent loss of power at thrust-bearings.

The invention is of especial value for screw-steamships to reduce the loss of power by friction of the shaft-collars against the thrust-bearings. It may also be applied advantageously to vertical shafts—as, for instance, when it is desired to generate electricity by power from a steam-engine or other source.

A particular object of the invention has been to provide a device of this character the parts of which can be removed for inspection and repair without moving the shaft out of place.

My invention therefore resides in the novel construction, combination, and arrangement of parts for the above ends hereinafter fully specified, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a portion of a screw-propeller shaft having my invention applied thereto. Fig. 2 is a plan view of the same. Fig. 3 is a central transverse section of the same. Fig. 4 is a longitudinal section of a roller-carrier through its center. Fig. 5 is a side view of the roller-carrier. Fig. 6 is a side view of a bearing-plate. Fig. 7 is a similar view showing the two parts thereof separated. Fig. 8 is a cross-section of a carrier on the line A A of Fig. 4, the sections thereof being slightly separated. Fig. 9 is a similar view on the line B B of Fig. 4. Fig. 10 is a cross-section of a bearing-plate on the line C C of Fig. 6. Fig. 11 is a rear view of a portion of said bearing-plate. Fig. 12 is an enlarged detail showing the device for clamping together the sections and halves of sections of the roller-carrier. Fig. 13 is a perspective view of machinery having a vertical shaft to which my device is applied. Fig. 14 is a vertical section of the same. Fig. 15 is a horizontal section taken above the roller-carrier, and Fig. 16 is a section on the line E E of Fig. 15.

Referring to the drawings, 1 represents a suitable frame in which is supported in bearings 2 the shaft-section 3, bolted, as at 4, to the propeller-shaft 5, and, as at 6, to the crank-shaft 7. Upon said shaft-section 3 are secured thrust-collars 8, which in my invention carry bearing-plates 9. Said bearing-plates are made of the best tool-steel to take the pressure from rollers 10, mounted in roller-carriers 11. Each roller 10 is mounted on a spindle 12, the ends of which form trunnions to rotate in sockets 13, formed in the two sections of the roller-carrier. Each roller-carrier consists of two sections divided along a central plane at right angles to the axis, said sections being joined by countersunk screws 15, and the sections are again divided into halves along a plane through said axis. The roller-carrier is, as shown, of circular form, but its circular periphery is cut down or notched, as at 52, on each side of the ends of the dividing diameter, so that the projecting ends of the devices used for connecting the parts together will not extend above or without the circumference of the said peripheral circle of the carrier. Thereby it is permitted to maintain the frame of small dimensions relatively to the carrier, or, which is the same thing, to permit the carrier itself to be of large dimensions relatively to the frame, thus permitting a relatively large bearing or thrust surface. The halves are fitted together with dowel-pins 16, and when the sections are fitted together two half-sockets 17 on each side register with each other to form sockets to receive double-ended bolts 18. Upon the two threaded ends of each bolt 18 are screwed nuts 19, which are screwed down, so that conical sockets 55 in the inner faces of said nuts surround conical ring-sections at the top of the sockets 17, and so clamp the same firmly, thereby securing the sections together, while the bolts 18 and nuts 19 secure the halves together. Said bolts have central heads 53, which are received in sockets 54 in the opposing faces of the carrier-sections. These heads prevent the bolts

dropping down through the sockets 17 of the lower carrier-section when the upper nuts, holding down the upper section, are removed. Said roller-carriers revolve loosely upon the shaft 3, and the bearing-plates 9, secured to the thrust-collars on the shaft, press against the rollers 10 on one side, while on the other side said rollers roll against bearing-plates 20, secured in the ends of an abutment 21, which is reduced in its central portion, but with enlarged or flanged ends, and which is formed of upper and lower sections 22 23, the lower section being secured by screws to the walls 24 of the frame, while the upper section is secured to the lower by means of bolts and nuts. The abutment 21 has a central aperture sufficiently large to permit the shaft 3 to pass loosely therethrough.

By making the roller-carrier in sections and in halves, as above described, it is readily removable without removing the shaft from its bearings, and for a similar reason the bearing-plate 9 is made in two sections, as shown in Fig. 7. The two sections of the bearing-plate are separated on two lines meeting at the center at an angle of one hundred and fifty degrees, and since the rollers are arranged in the roller-carrier at an angle of sixty degrees from each other this arrangement insures that at no time will two of the rollers pass a joint in the bearing-plate at the same time, thereby insuring absence of jar.

The bearing-plates 9 are secured to the thrust-collars 8 by means of countersunk bolts and screws 24. In order still further to insure a close joint of said sections of the bearing-plate, there are provided diametrically opposite clamps 28, having curved faces 29 to abut against the periphery of the bearing-plate, their rear side being let into sockets 30, formed in the thrust-collars 8.

By screwing down the clamps 28 they are pressed firmly against the periphery of the bearing-plate, and the two sections of the latter are held firmly together with very tight-fitting joints.

In Figs. 13 to 16 I have illustrated the improvement as applied to a vertical shaft. In this case power is transmitted by a belt to a pulley 33 on a vertical shaft 36, supported in guides 37 on a frame 38. Said shaft has secured thereon a thrust-collar 39, to which is secured in like manner as before the bearing-plate 40, which rotates on the rollers 41, pivotally mounted in the roller-carrier 42, formed of the upper and lower sections bolted together, said rollers 41 rolling on a base 43, resting on the bed 44. Upon the upper end of the shaft 36 is carried a disk 45, on which is secured a heavy weight 46, which acts as a fly-wheel, and on said weight 46 is again secured a disk 47, attached to the lower end of the shaft 48 of the dynamo 49, said dynamo being supported by the frame 38.

In the modification last referred to the carrier-sections are not shown as formed in halves removable laterally from each other, as this is not necessary except where the shaft, weight 46, and dynamo are unusally heavy; but said sections may be made in halves, as in the modification first shown, if so desired.

The side walls 24 and the end walls 50 form a tank in which is contained oil for lubricating the parts, and a casing (shown in dotted lines at 51) may be provided to cover the apparatus and prevent the oil from splashing.

When the propeller-shaft (shown in Figs. 1 and 2) is revolving in the direction to propel the ship ahead, the thrust will be forwardly on the abutment 21, and the roller-carrier 11 to the rear of said abutment, the one to the left in Figs. 1 and 2, will be in use—that is, the pressure will be between the rollers of said carrier and the adjacent bearing-plates on the thrust-collar and abutment. At the same time there will be no pressure on the rollers of the forward carrier. When going astern, the reverse will be the case—the rear roller-carrier will be free and the forward roller-carrier will take the pressure.

If desirable, a series or plurality of the devices herein described may be used to distribute the pressure. This may be necessary in very large vessels, where the thrust of the propeller is very great.

I claim—

1. In a device of the character described, the combination of a shaft, a thrust-collar thereon, a fixed abutment, bearing-plates removably secured to said collar and abutment on opposing faces thereof, each plate being divided into sections along radial lines extending from the center at such an angle with each other as to pass beneath the hereinafter-mentioned rollers dissimultaneously, a roller-carrier mounted loosely on the shaft between said collar and abutment, and divided diametrically into sections, and a circular series of an even number of rollers carried by said carrier, said rollers being interposed between the bearing-plates on the collar and abutment, substantially as described.

2. In a device of the character described, the combination of a shaft, a thrust-collar thereon, a fixed abutment, bearing-plates removably secured to said collar and abutment on opposing faces thereof, each plate being divided into sections along radial lines extending from the center at such an angle with each other as to pass beneath the hereinafter-mentioned rollers dissimultaneously, a roller-carrier mounted loosely on the shaft between said collar and abutment, and divided diametrically into sections, and a circular series of rollers carried by said carrier, said rollers being interposed between the bearing-plates on the collar and abutment, substantially as described.

3. In a device of the character described, the combination of a shaft, a thrust-collar thereon, a fixed abutment, bearing-plates removably secured to said collar and abutment on opposing faces thereof, said plates being di-

vided into sections, clamps at the periphery of said plates, means for moving said clamps inwardly to clamp said plate-sections tightly together, a roller-carrier mounted loosely on said shaft between said collar and abutment, and a circular series of rollers carried by said carrier, said rollers being interposed between the bearing-plates on the collar and abutment, substantially as described.

4. In a device of the character described, the combination of a shaft, a thrust-collar thereon, a fixed abutment, a roller-carrier mounted loosely in the shaft between said collar and abutment, and a circular series of rollers carried by said carrier, each roller being fixedly secured on axles extending radially from the center of the carrier, the outer ends of said axles being stepped in the carrier and preventing their radial movement, and the carrier being divided into sections on a plane at right angles to the shaft, each section having inner and outer series of half-bearings to receive the ends of said roller-axles, substantially as described.

5. In a device of the character described, the combination of a shaft, a thrust-collar thereon, a fixed abutment, a roller-carrier mounted loosely on the shaft between said collar and abutment, a circular series of rollers carried by said carrier, said rollers being interposed between the collar and abutment, and a frame comprising end walls supporting said shaft, and side walls supporting the upper section of the abutment, said side walls and end walls being closed to form an oil-tank for lubricating the moving parts, substantially as described.

6. In a device of the character described, the combination of a shaft, a thrust-collar thereon, a fixed abutment, a roller-carrier mounted loosely on the shaft between said collar and abutment, and divided diametrically into sections, a circular series of rollers carried by said carrier and interposed between the collar and abutment, and bolts connecting the two sections of the carrier at the ends of said diameter, said roller-carrier being of circular form but its circular periphery being cut down or notched on each side of the ends of the dividing diameter whereby the projecting ends of the bolts may lie in said notches and below or within the circumference of the said peripheral circle of the carrier, thereby avoiding projections beyond said circumference, substantially as described.

7. In a device of the character described, the combination of a shaft, a thrust-collar thereon, a fixed abutment, a roller-carrier mounted loosely on the shaft between said collar and abutment and divided diametrically into sections, a circular series of rollers carried by said carrier and interposed between the collar and abutment, and double-ended bolts, each having a central head contained in recesses or sockets in the opposing faces of the carrier-sections, the threaded ends of each bolt being passed through said sections, and nuts on said threaded ends, substantially as described.

8. In a device of the character described, the combination of a shaft, a thrust-collar thereon, a fixed abutment, a roller-carrier mounted loosely on the shaft between said collar and abutment, and divided diametrically into sections, a circular series of rollers carried by said carrier and interposed between the collar and abutment, said roller-carrier being of circular form, but its circular periphery being cut down or notched on each side of the ends of the dividing diameter, and double-ended bolts connecting the two sections of the carrier at the ends of said diameter, each bolt being threaded at each end, and said threaded end projecting into one of said notched portions, and nuts on the ends of the bolts in said notched portions, substantially as described.

9. In a thrust-bearing, in combination with a circular series of rollers, a carrier therefor divided diametrically into sections and also divided on a plane at right angles to the axis, double-ended bolts at the ends of the aforesaid diameter, extending in said plane on each side of said diameter, and nuts on the threaded ends of said bolts, said nuts having on their inner faces conical sockets, and the carrier-sections having conical ring-sections adapted to fit into said sockets and to be clamped by said nuts, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOSIAH PORRITT.

Witnesses:
FRANCIS M. WRIGHT,
M. T. BEGLEY.