No. 721,624. PATENTED FEB. 24, 1903.

G. E. TREGURTHA.

DEVICE FOR REVERSING MOTION.

APPLICATION FILED MAR. 5, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

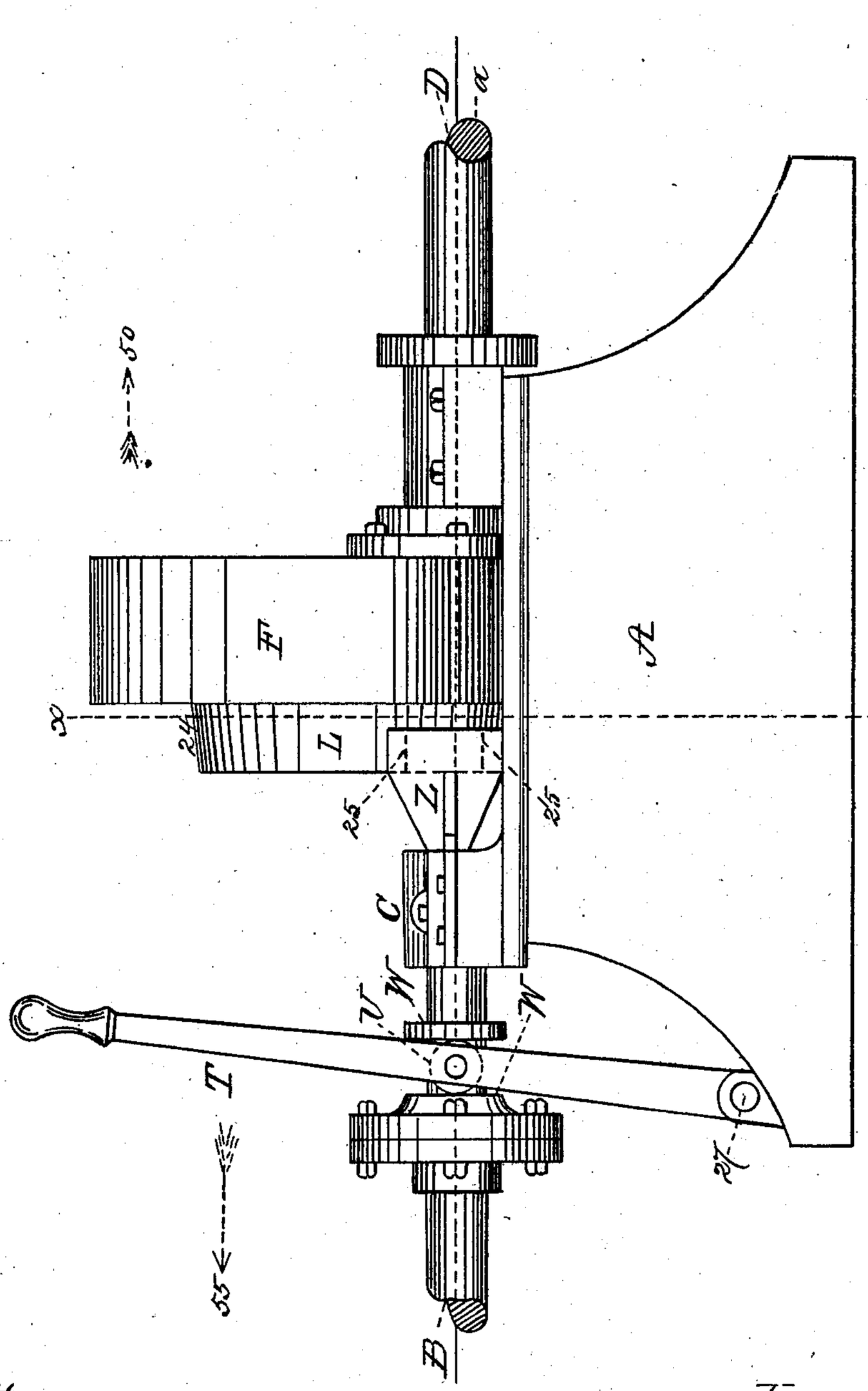

Fig. 1.

Witnesses,
A. F. Stearns
Geo. R. Sladen

Inventor,
George E. Tregurtha,
per Norman W. Stearns,
Attorney.

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NO MODEL. 4 SHEETS—SHEET 2.

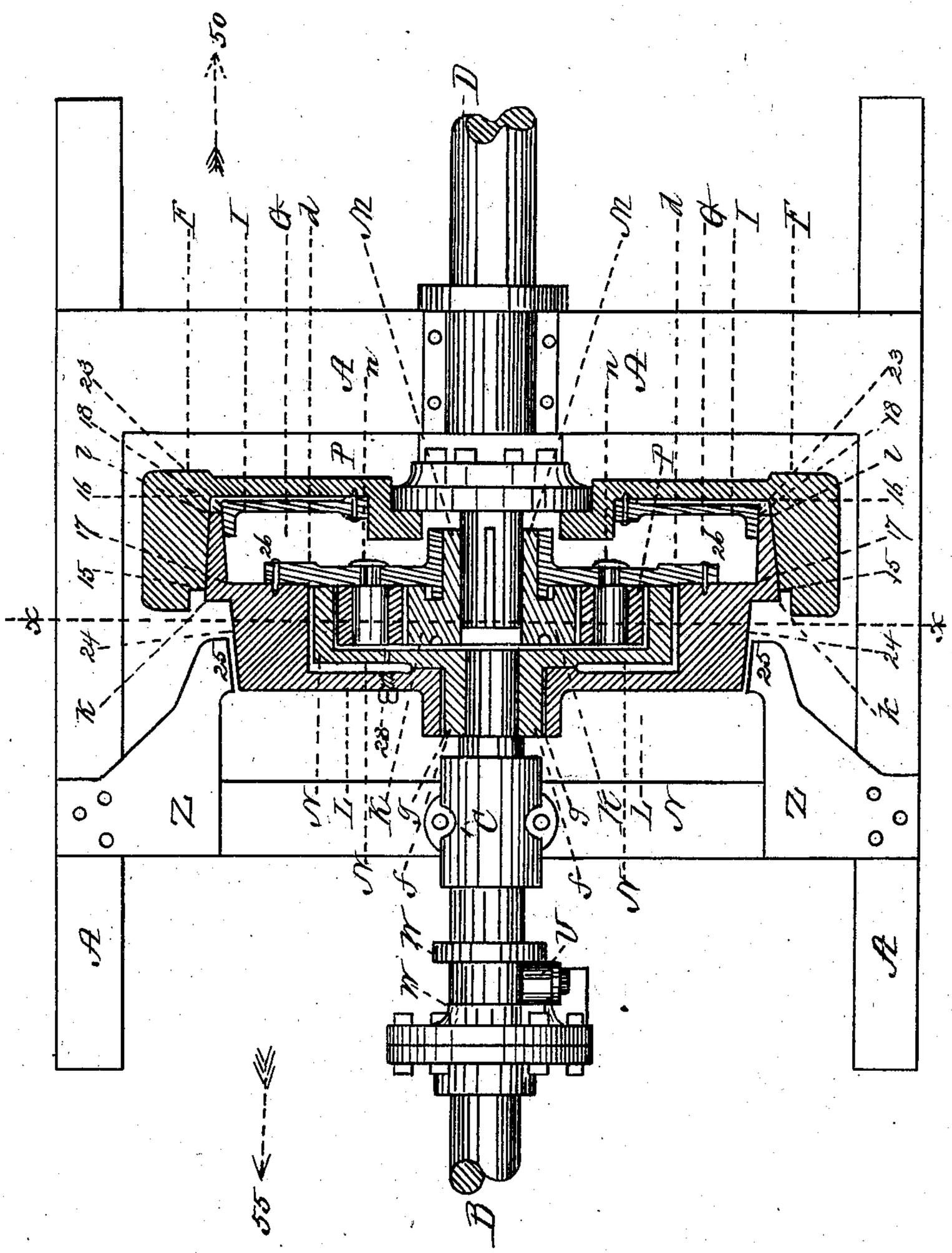

FIG. 2.

Witnesses;
A. F. Stearns
Geo. P. Slader

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NO MODEL. 4 SHEETS—SHEET 3.

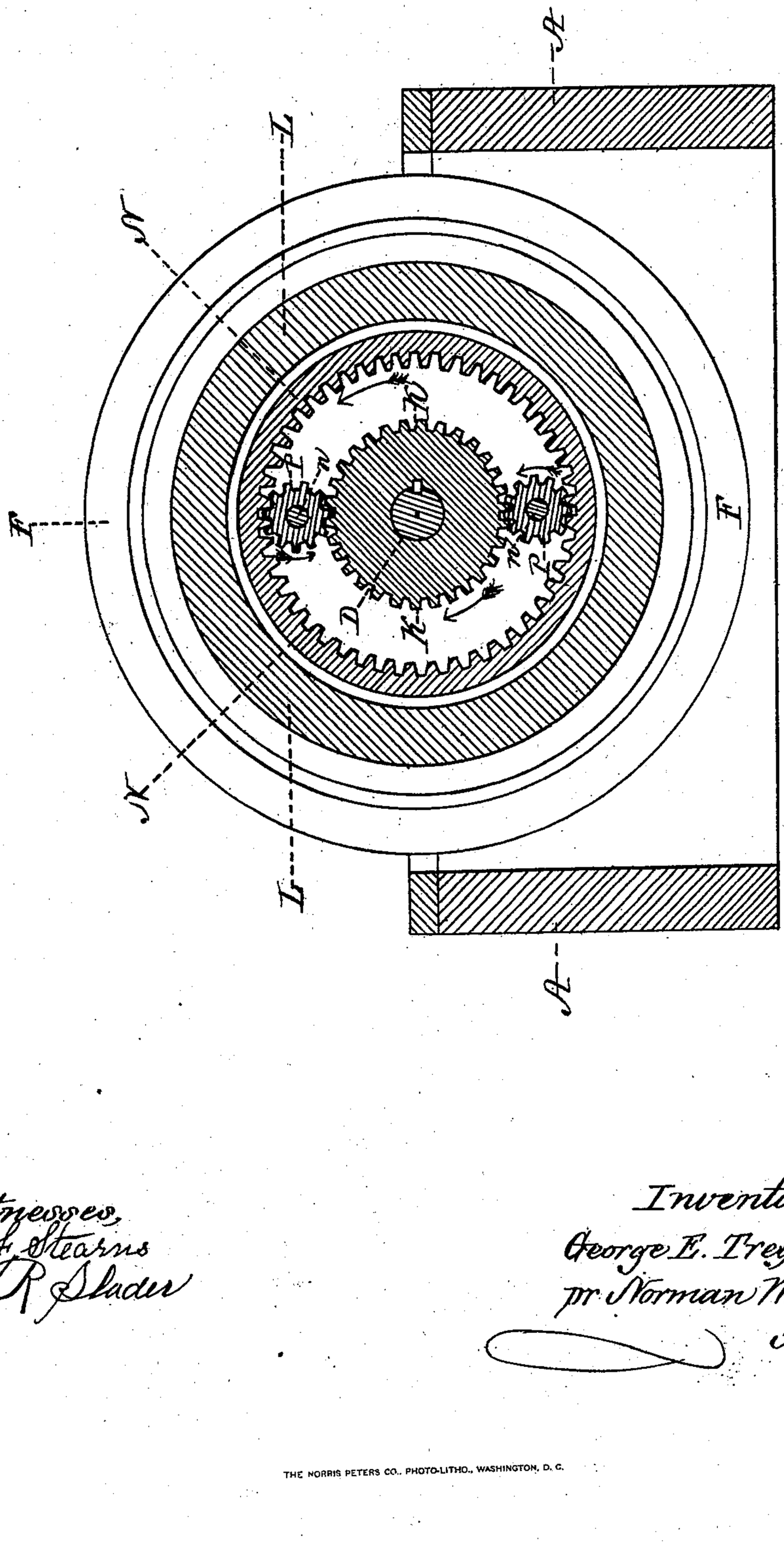

Fig. 3.

Witnesses,
A. L. Stearns
Geo R Slader

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APPLICATION FILED MAR. 5, 1902.

NO MODEL. 4 SHEETS—SHEET 4.

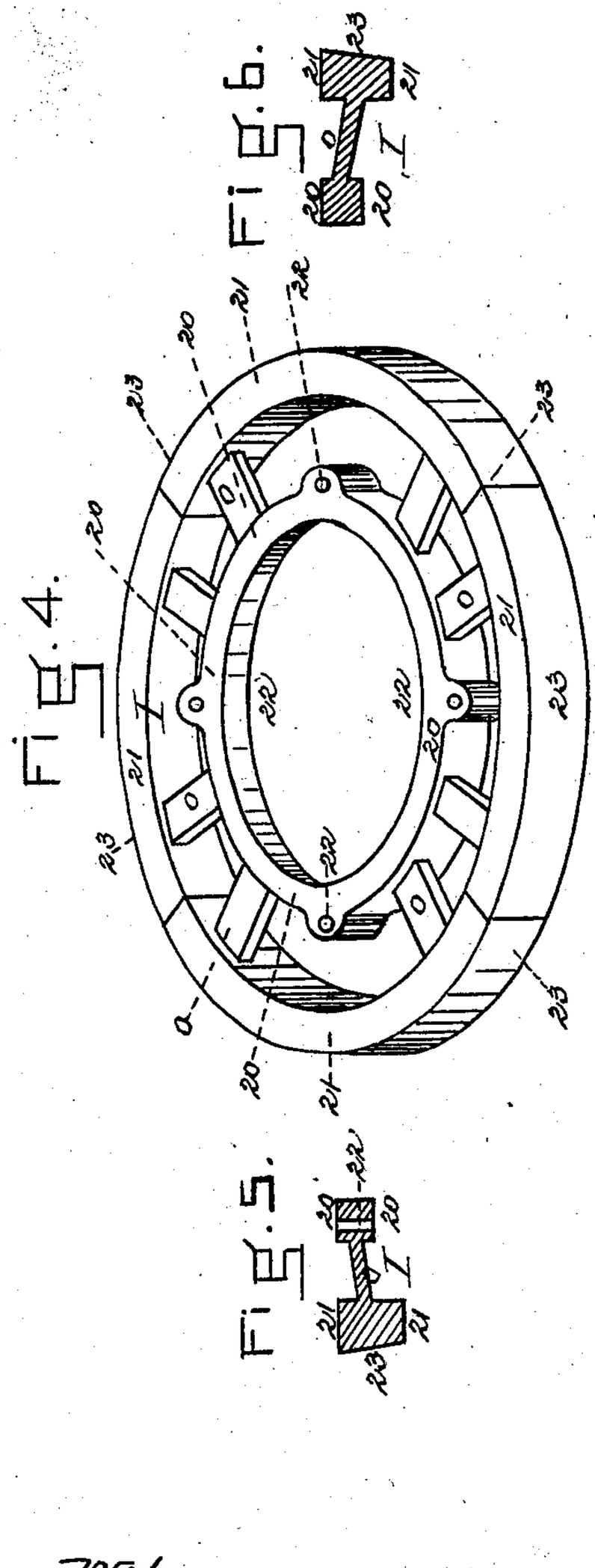

Fig. 4.

Fig. 6.

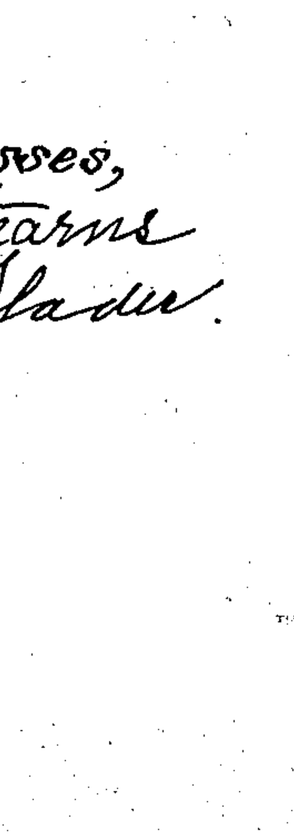

Fig. 5.

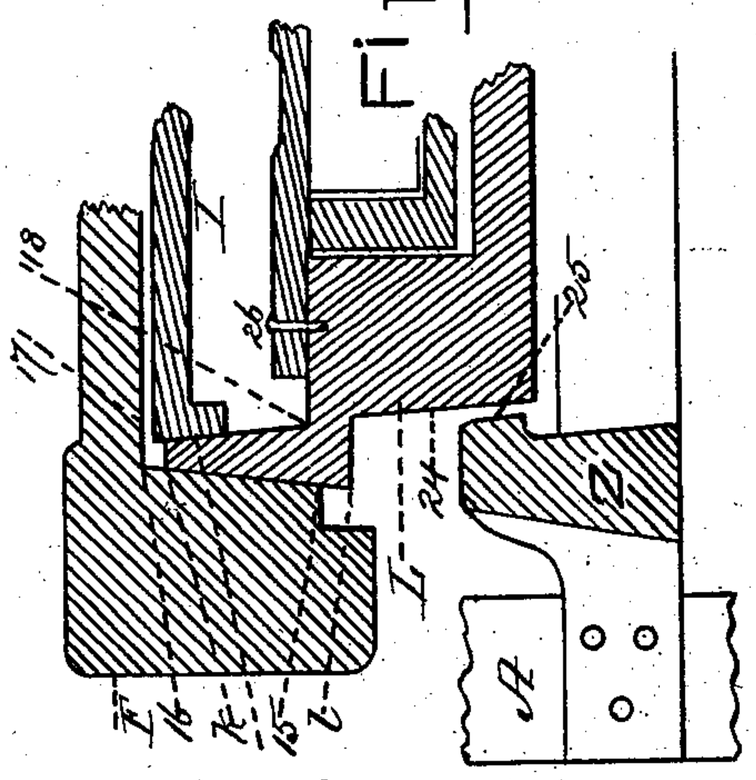

Fig. 8.

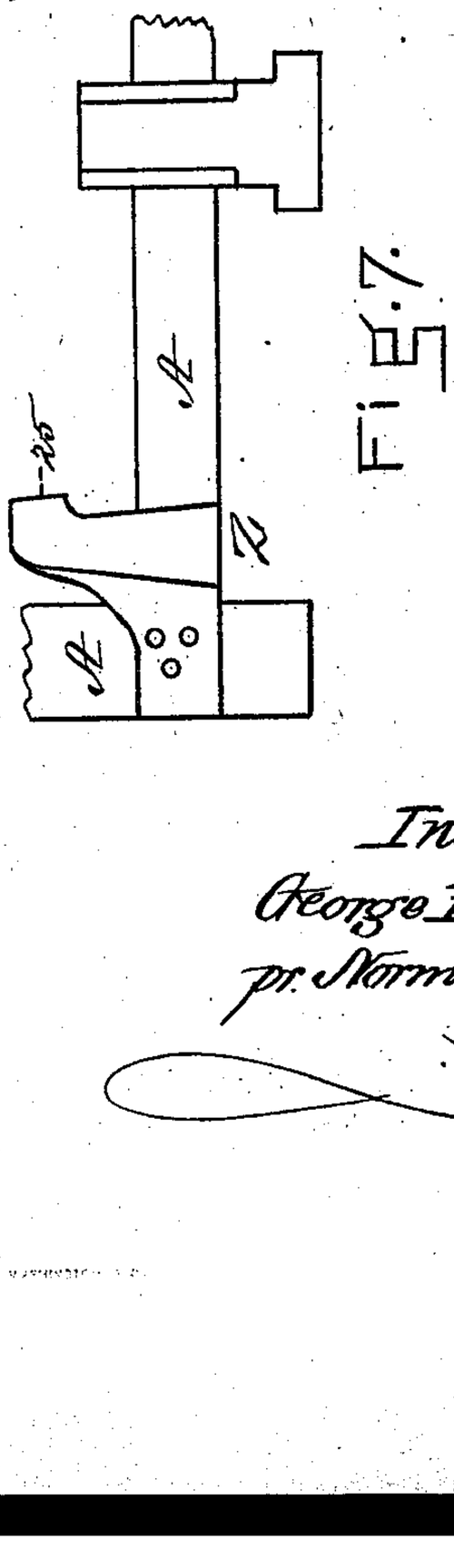

Fig. 7.

Witnesses,
A. F. Stearns
Geo P Slade.

Inventor,
George E. Tregurtha,
pr. Norman W. Stearns,
Attorney

UNITED STATES PATENT OFFICE.

GEORGE EDWARD TREGURTHA, OF MAL[illegible], MASSACHUSETTS.

DEVICE FOR REVERSING MOTION.

SPECIFICATION forming part of Letters Patent No. 721,624, dated February 24, 1903.

Application filed March 5, 1902. Serial No. 96,824. (No model.)

To all whom it may concern:

Be it known that I, GEORGE EDWARD TREGURTHA, of Malden, county of Middlesex, and State of Massachusetts, have invented certain Improvements in Devices for Reversing Motion of Propeller-Wheels, &c., of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 represents a side elevation; Fig. 2, a central horizontal section, the power-shaft and the propeller-shaft being in plan; Fig. 3, a vertical transverse section on the line *x x* of Figs. 1 and 2 looking in the direction of the dotted arrow 50; Fig. 4, a perspective view of a plate which constitutes a new member of my clutch mechanism. Figs. 5 and 6 are local transverse sections through said clutch member; Fig. 7, a detail showing a stationary clutch member having but two diametrically opposite tapering bearings, one only being represented; Fig. 8, a sectional detail showing the several clutch members enlarged and assembled together.

My present invention has particular reference to the reversing devices of propeller-wheels set forth in United States Letters Patent No. 611,187, issued to me September 20, 1898, in which certain clutch mechanism coacting with other instrumentalities was employed in applying, suspending, and changing the direction of the motion as desired. In the invention recited in said patent a revolving casing surrounding a gear carried by the power-shaft has a double clutch-surface at its periphery which was caused to alternately engage with a clutch-wheel secured to and revolved by the power-shaft and a stationary clutch-ring secured to the framework. By the said construction the several operations of starting, stopping, and reversing the motion of the propeller-wheel were ordinarily accomplished in a satisfactory manner; but occasionally when the reversing-lever was suddenly shifted (through inadvertence or inexperience) a lack of promptness, slight deficiency in holding ability, or want of smoothness of motion was temporarily experienced, which affected the ease of the occupant of the conveyance and in time caused the uneven wear of the parts in contact.

This invention successfully overcomes the aforesaid objections; and it consists in the novel clutching mechanism by means of which the movements of the propeller or driven shaft are controlled, which I will now proceed to describe.

In the said drawings, A represents the frame, secured in its proper position in the boat or vehicle.

B is the driver or propeller wheel shaft, the inner end of which rotates in a bearing C and its other end in a bearing. (Not shown.)

D is the driving or power shaft, located in the prolongation of the axis of the propeller-shaft, the contiguous ends of the two shafts being removed a short distance from each other and the end *a* of the power-shaft being shown as broken off, but intended to be driven by any suitable power. Secured to the driving-shaft D is a circular clutch-wheel F, having in one side a large central opening G, the inner wall of which is tapered downward and inward to form a clutch-surface 15 16, Figs. 2 and 8, the wheel F also acting as a balance-wheel. One of the prominent features of my present invention is an auxiliary clutching member consisting of a circular plate I, having an inner rim 20 and an outer rim 21, connected by radial braces *o* and secured by bolts at 22 to the inner side of the clutch-wheel F, Figs. 2 and 8. The peripheral face of the rim 21 is divided into several segments or sections and forms a tapering clutch-surface 23 of less diameter than the opening G in the clutch-wheel, so as to leave a vacant space at this place for the reception or entrance of the clamping-surfaces of a newly-constructed casing L (presently to be described) and forming another prominent feature of this invention.

The power-shaft has secured to its end a gear-wheel K, which turns therewith and is preferably located within a recess formed in the casing L and between such casing and a face-plate *d*, secured thereto by the bolts 26. The plate *d* is fitted to the hub M of the gear K, upon which it is free to rotate, while the casing L is mounted freely upon the hub *f* of an internal gear N, that is keyed to the driven shaft B. The larger portion of the casing L, which is disposed over the hub of this internal gear, terminates at its periph-

ery in three tapering clamping-surfaces, which are formed integral therewith instead of being provided with a separate clutch-ring, as heretofore. The clamping-surfaces of the casing L by my improved construction are, viz., an outer one, *k l*, which forms an inclined annular wall conforming to the taper of the clutch-surface 15 16 of the wheel F, with which it coacts, an inner clutching-surface 17 18 of less diameter than that *k l* and with a taper corresponding with the outer tapering surface 23 of the newly-created clutch member I, and a third clamping-surface 24 of less diameter (here) than that 17 18 and intended to conform to and coact with two inclined clamping-surfaces 25 25 of a casting Z, secured to the framework, these clamping-surfaces 25 25 being located diametrically opposite each other, the clutch-ring (designated S in my prior patent, No. 611,187, which was a continuous stationary ring) being dispensed with and the said clutch device having only two bearing-surfaces being substituted therefor.

The purpose of the divided or sectional clamping member I and the newly-constructed casing L, with its three tapering or clutching surfaces, together with the stationary device Z, having two separate bearing-surfaces, is to enable the attendant to manipulate the reversing-lever T more easily and promptly and with an elasticity which does not impair the tenacity of the grip of the clutching-surfaces, the result being a reduction and more even wear of the parts and the avoidance of unnecessary vibrations.

As the construction of the remainder of the reversing mechanism is substantially the same as set forth in United States Patent No. 611,187 and as I wish to show an operative apparatus and also the relation of my new clutching devices thereto, I will now refer to the description contained in said patent.

P P are two diametrically opposite pinions arranged to revolve on stationary studs *n*, riveted to the side or plate *d* of the casing L, said pinions engaging with the gear K and also with the internal gear N. (See Fig. 3.) Means for oiling the gearing may be provided through a hole 28 in the casing leading to another in the internal gearing, the holes being controlled by a removable plug. The reversing-lever T is pivoted at 27 to the frame A and is provided with a friction-roll V, pivoted on its inner side and located between two circular flanges W on the propeller-wheel shaft B, by which construction when the lever is swung to the left in the direction of the dotted arrow 55 the propeller-wheel shaft is moved in the same direction, and the casing L, with its friction or clamping surfaces, will be moved so as to disengage its clutching-surface *k l* from the clamping-surface 15 16 of the clutch-wheel F and also withdraw the clutching-surface 17 18 of the casing from the tapering surface 23 of the new clamping member I, simultaneously with which the third clamping-surface 24 of the casing will be brought into a position to engage with the clamping-surfaces 25 25 of the stationary clutching device Z, secured to the frame, which will stop the casing L from rotation. Whatever be the position to which the friction member L of the clutch is moved by the lever T it is necessary that engagement be maintained between the gearing that connects the shafts B and D, and this I secure in the form of my invention herein illustrated by so mounting the gear K that it is free to have a limited amount of sliding motion on the shaft D. The parts being in the position seen in Fig. 2, when power is applied to the shaft D the clutch-wheel F is turned, and as the casing L is frictionally engaged by its beveled surface *k l* with the internal beveled surface 15 16 of the clutch-wheel F and the beveled surface 17 18 of said casing also frictionally engaged with the beveled surface 23 of the clamping member I the casing is rotated therewith, and as the pinions P P are free to revolve on their studs riveted to the casing the pinions will be carried around with the latter without revolving on their studs, but cause the internal gear N to rotate with the casing, which being keyed to the propeller-wheel shaft B will be revolved in common with said shaft in the same time and direction and carry the boat, &c., forward. To reverse the direction of the boat, move the handle of the lever T to the left, which moves the propeller-shaft in its bearings and also the internal gear secured to said shaft, and as the casing incloses the internal gear they are both moved in the same direction sufficiently to withdraw the clutching-surfaces of the casing from those of the clutch-wheel F and new clutch member I and enable the third clutching-surface of the casing to engage with the two clutching-surfaces 25 25 of the stationary clutch Z, secured to the frame, which prevents the revolution of the casing. The central gear K is now carried around with the power-shaft D, which revolves the intermediate pinions P P, which in turn drive the internal gear N in the opposite direction to the rotation of the power-shaft, and as the internal gear is secured to the propeller-wheel shaft the latter is caused to revolve in the opposite direction to the power-shaft, thus reversing the motion of the boat without changing the direction of the power.

To stop the rotation of the propeller-wheel in either direction and without changing the motion of the driving-shaft, it is only necessary to operate the shifting-lever so as to bring the casing L into such position that its clamping-surfaces *k*, *l*, 17, 18, and 24 will severally be withdrawn from contact with the clamping-surfaces 15 16 of the clutch-wheel F, the beveled surface 23 of the clutch member I, and also the two beveled surfaces 25 25 of the stationary clutch Z; but as the casing in this

released position will revolve with the power-shaft and carry around therewith bodily the pinions P P they will have no influence on the internal gear to move the propeller-wheel shaft, and consequently the boat will be stationary, although the power-shaft may be in motion.

Although the clutching-plate I furnishes additional frictional surface, it may be omitted or may be used without being divided into segments, and the newly-constructed casing formed integral with one of its sides and having but two peripheral clutching-surfaces *k l* and 24, coacting with the tapering surfaces 15 16 of the balance clutch-wheel and the surfaces 25 25 of the newly-constructed stationary clutching device Z, may be employed with more satisfactory results than when the casing as heretofore constructed was used with the continuous clutching-surface of a stationary clutching device; but I prefer the employment of a sectional auxiliary clutch-plate I with the newly-constructed casing having three clutching-surfaces and the newly-constructed stationary clutch with two clamping-surfaces, as thereby I obtain the best possible results, as herein previously recited.

I claim—

1. In combination, a driving-shaft, a driven shaft, a clutch member carried by the driving-shaft having two oppositely-inclined friction-surfaces one internal and the other external, a sliding clutch member having two clutch-faces arranged to engage respectively with the two clutch-faces of the clutch member carried by the driving-shaft, and planetary gearing arranged between the two shafts, the revolving pinions of which are carried by the sliding clutch member, substantially as set forth.

2. In combination, a driving-shaft and a driven shaft, a clutch-wheel secured to the driving-shaft, an auxiliary clutch member secured to the clutch-wheel, a casing adapted to revolve with and slide longitudinally relative to the driving-shaft and having three clutching-surfaces; two of which surfaces are arranged to engage respectively with the clutch-surface of the clutch-wheel and that of its attached clutching member, a stationary clutch device secured to the framework and with which stationary clutch the third clutching-surface of the casing engages, a gear on the driving-shaft, a gear secured to the driving-shaft, one or more intermediate pinions pivoted to said casing, and adapted to engage with the driving-shaft gear and the driven-shaft gear, and mechanism for moving the clutch-endowed casing in opposite directions, substantially as set forth.

3. In combination, a driving-shaft and a driven shaft, a clutch-wheel secured to the driving-shaft, a sectional auxiliary clutch member secured to the clutch-wheel, a casing adapted to revolve and slide longitudinally upon the driving-shaft and having three clutching-surfaces, two of which are arranged to engage respectively with the clutch-surface of the clutch-wheel and the clutch-surface of its attached sectional member, a stationary clutch device formed with two clamping-surfaces and secured to the framework, and with which stationary clutch, the third clutching-surface of the casing engages, a gear adapted to revolve and slide longitudinally upon the power-shaft, and inclosed by said casing, a gear secured to the driven shaft, one or more intermediate gears pivoted to said casing and adapted to engage with the driving-shaft gear and the driven-shaft gear, and mechanism for moving the clutch-formed casing back and forth upon the driving-shaft, constructed and arranged to operate substantially as described.

4. In combination, a driving-shaft and a driven shaft, a clutch-wheel secured to the driving-shaft, a sectional auxiliary member secured to the clutch-wheel, a casing adapted to revolve and slide longitudinally on the driving-shaft and having three clutching-surfaces, two of which are arranged to engage respectively with the clutch-surface of the balance clutch-wheel and the clutch-surfaces of its attached sectional member, a stationary clutch device formed with two diametrically opposite clamping-surfaces and secured to the framework, and with which stationary clutch, the third clutching-surface of the casing engages, a gear adapted to revolve and slide longitudinally on the power-shaft and inclosed by said casing, an internal gear N carried by the driven shaft, one or more intermediate gears pivoted to said casing and adapted to engage with the driving-shaft gear and the driven-shaft gear, and mechanism for moving the clutch-acting casing backward and forward upon the driving-shaft, constructed and arranged to operate substantially as specified.

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

GEORGE EDWARD TREGURTHA.

Witnesses:
N. W. STEARNS,
WM. TREGURTHA.