No. 760,218. PATENTED MAY 17, 1904.

J. J. LEFINSKI.

DRIVING GEAR FOR BOATS, &c.

APPLICATION FILED DEC. 21, 1903.

NO MODEL.

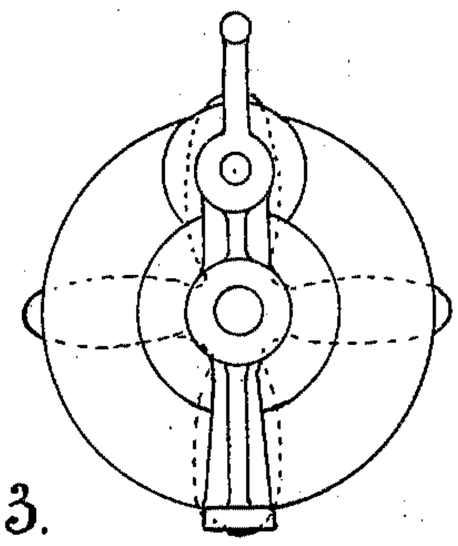


Fig. 3.

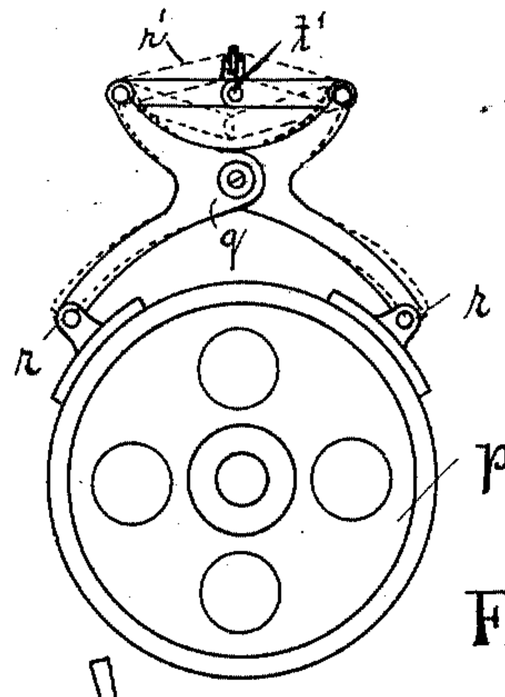


Fig. 4.

Fig. 1.

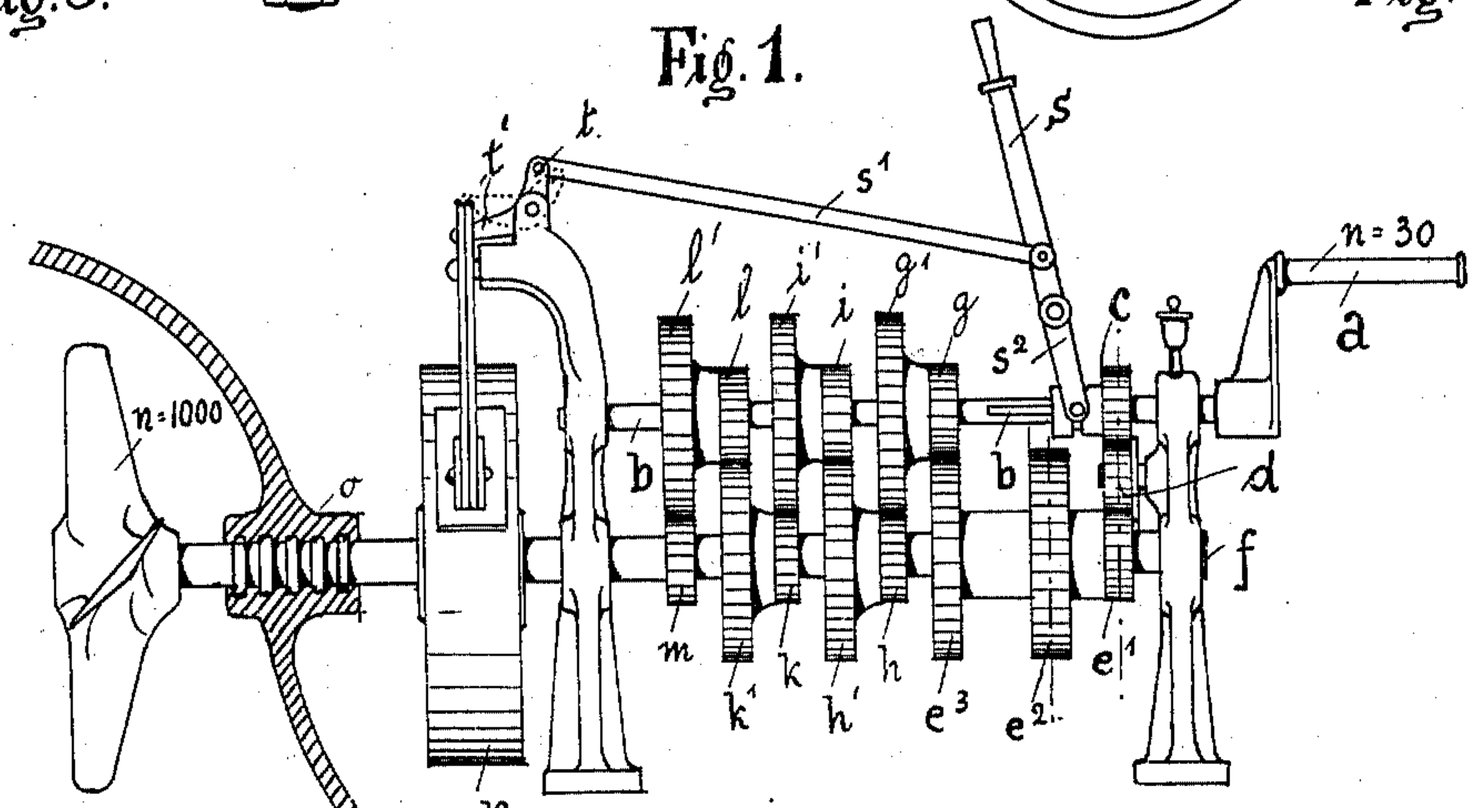
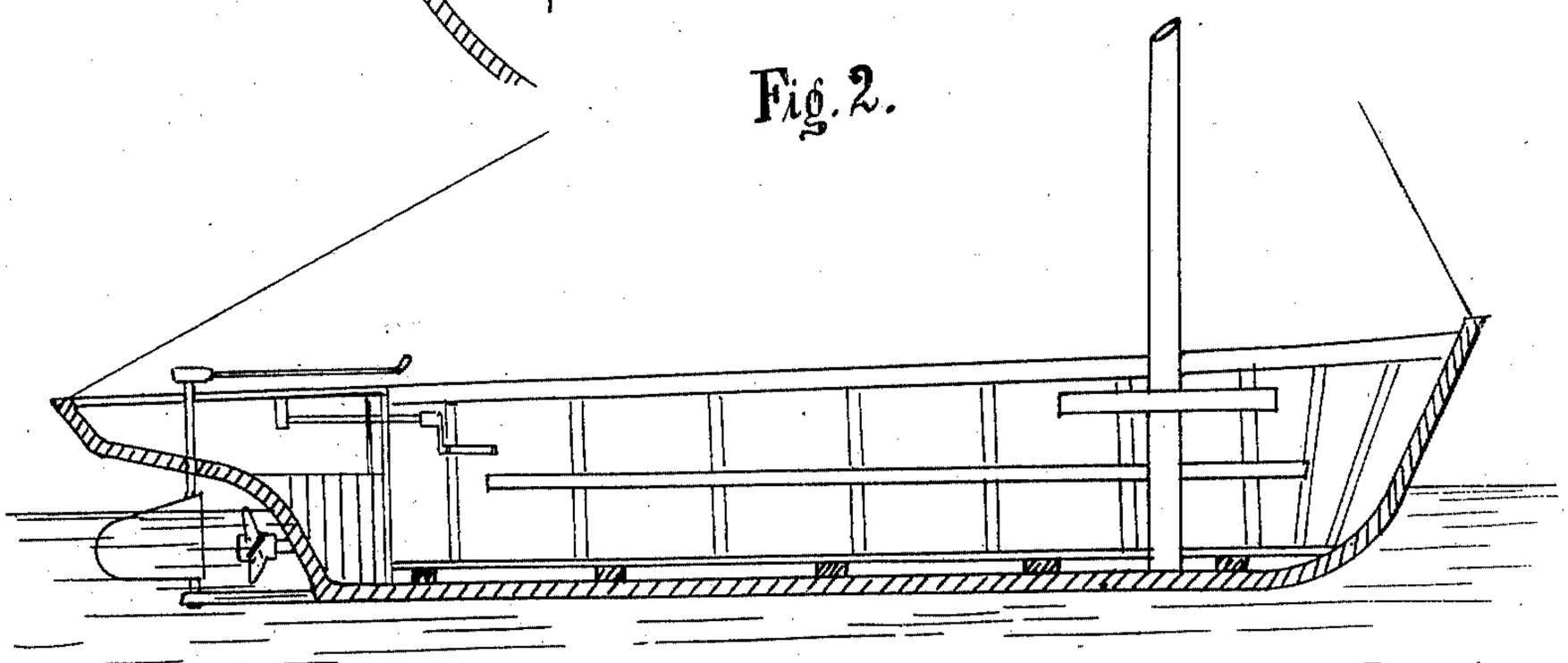


Fig. 2.



Witnesses.
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Att'y.

No. 760,218. Patented May 17, 1904.

UNITED STATES PATENT OFFICE.

JOHANN JAKOB LEFINSKI, OF HAMBURG, GERMANY, ASSIGNOR OF ONE-HALF TO FRIEDRICH WILHELM ALT, OF HAMBURG, GERMANY.

DRIVING-GEAR FOR BOATS, &c.

SPECIFICATION forming part of Letters Patent No. 760,218, dated May 17, 1904.

Application filed December 21, 1903. Serial No. 186,024. (No model.)

To all whom it may concern:

Be it known that I, JOHANN JAKOB LEFINSKI, residing at Veddeler Brückenstrasse 16, Hamburg, in the Empire of Germany, have invented new and useful Improvements in and Connected with Driving-Gear for Boats and other Vehicles, of which the following is a specification.

This invention relates to a device for transmitting power by means of which, commencing with slow but powerful initial motion, a rapid speed of rotation is finally attained. This kind of power is intended for boats and the like, in which by more rapid revolutions of the propeller a more effective action is insured than with slowly-revolving propellers. The increased efficiency owing to the propeller rotating at a higher speed more than counterbalances the slightly-increased friction in the gear. The most important point, however, in connection with the device hereinafter described is the possibility of securing a desirable speed with a slow working power, and thus avoiding imparting to the muscles a frequently-recurring motion, as would be the case if the revolutions were effected directly by hand. Combined with this mechanism, which is shown in the accompanying drawings as applied to a device for driving a boat, is the necessary reversing-gear, which is arranged so that when the vessel is to be backed (and the momentum of the vessel has to be overcome, and therefore the work to be done is greater) the reverse revolutions of the propeller are slower than those in the forward direction. Further, combined with the mechanism is a brake device which is operated when the motion is reversed and brings the revolving propeller to rest before a change from one direction to the other can be effected, so that each movement begins from a state of rest without the necessity of stopping the crank motion effected by hand.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the device. Fig. 2 shows the position in a boat which is to be driven. Fig. 3 is a view of the propeller, and Fig. 4 shows the arrangement of the brake.

The motion of the crank *a*, which is assumed to make thirty revolutions per minute, is transmitted to the shaft *b*, on which the tooth-wheel *c* is mounted by means of a feather-key. The forward motion is transmitted from *c*, through the medium of the intermediate wheel *d*, to a set of wheels e' e^2 e^3. The set of wheels e' e^2 e^3 rotate loosely on the shaft *f* in the same manner as the following sets of wheels *g g'*, *h h'*, *i i'*, *k k'*, *l l'* rotate loosely around the shafts *b* or *f* and finally transmit the power to the tooth-wheel *m*, which is mounted fast upon the lower shaft *f* and actuates the propeller.

O is the thrust-bearing of the propeller-shaft *f*.

The different sets of wheels may be geared one with the other in any preferred ratio. The drawing is based on the assumption that with the crank making thirty revolutions the propeller will make one thousand revolutions per minute. With such a speed the propeller-blades need have but a slight pitch, and in consequence of the rapid revolutions, in conjunction with the slight pitch, the screw has less slip than screws which rotate slowly. The power is more effectually utilized, and the slightly-increased friction caused by the different intermediate gear-wheels is of no real importance, especially as this arrangement insures the best possible utilization of the space.

It should be noted that for driving the vessel only such bodily labor is necessary as can be conveniently performed, as the necessary movement at the crank is a slow one. By having a crank of suitable size the work to be performed can be reduced to the smallest possible extent.

As it is desirable that a vessel fitted with such driving mechanism may be easily maneuvered, the intermediate gear should be arranged to allow of the reversing action being easily effected.

In order to insure uniform motion, the main shaft *f* is furnished with a balance-wheel *p*, against the circumference of which the brake-shoes *r*, operated by the levers *q*, act. This takes place whenever the hand-lever *s* is placed vertically. The rod *s'* is therefore

pulled so as to operate the bell-crank lever *t*, and the projection *t'* of the lever *t* presses the toggle *r'* into the horizontal position, as indicated, and the braking action takes place. At the same time the driving mechanism is thrown entirely out of engagement, as when the lever *s* is placed vertically the lower forked end thereof, which engages in the usual manner, by means of a pin, a groove in the boss of a tooth-wheel *c*, puts the toothed wheel *c* out of gear. When any further movement is to be effected, the lever *s* is moved into the position indicated by dotted lines if a backward movement is to be effected, or into the position as fully drawn if a forward movement is to be effected. To whichever of these two positions the lever *s* is moved the bell-crank lever *t* raises or lowers (as the case may be) the toggle *r'* and in both cases releases the brake-shoes *r*.

When the small tooth-wheel *c* is brought into engagement with the large tooth-wheel e^2, the motion of the propeller is reversed. In this way the working of the crank is facilitated, as the ratio of the gear whereby the speed of the propeller is reduced operates in the most beneficial manner for the operator. This is, however, necessary, as in the working of the vessel the reversing action generally occurs while the vessel is actually moving forward. The propeller therefore has to overcome the forward movement, and for this purpose requires more power, which can be imparted to it by the described method of transmitting the power to a large tooth-wheel.

For effecting the normal forward movement the rotary motion of the wheel *c* is almost entirely transmitted to the wheel *e'*. The arrangement illustrated may be altered, so that instead of the wheels being all placed one behind the other they can be arranged adjoining one another in a special casing. This is determined by the amount of space available. The driving motion may also be started by means of lever-and-pedal action. This arrangement may be adopted for all kinds of vehicles in connection with which a permanent uniform rate of movement is of importance, as when such a number of revolutions is assured and the necessary uniformity imparted to the whole mechanism by the presence of a balance-wheel the final speed, which is thus again considerably reduced—as, for example, in the case of three-wheel vehicles, working engines, or the like—is also exceedingly uniform and otherwise than if the driving were effected direct.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an apparatus of the character set forth, the combination with a crank-shaft, of a gear *c* mounted on said shaft, an idler-gear with which said gear meshes, a third gear *e'* meshing with said idler-gear, a propeller-shaft on which said last-named gear is loosely mounted, a train of gears loosely mounted on said crank-shaft and said second shaft, a gear fixed on said second shaft meshing with the last member of said train, the proportions being such that the speed of the second shaft will greatly exceed that of the crank-shaft when the latter is turned.

2. In a driving mechanism of the character set forth, the combination of a crank-shaft, a second shaft, a slidable gear mounted on said crank-shaft, a gear on said second shaft with which said slidable gear is adapted to engage, an idler-gear with which said slidable gear is also adapted to engage at times, and a second gear on said second-named shaft meshing with said idler-gear, to drive said second shaft, a brake-wheel on said second shaft, a brake adapted to engage said wheel, a shift-lever for said slidable gear, and means connecting said lever and said brake, whereby the brake is set when the gear is shifted and released when the gear engages with one of the gears to drive the second-named shaft.

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

JOHANN JAKOB LEFINSKI.

Witnesses:
E. H. L. MUMMENHOFF,
T. CHRIST. HAFERMANN.