(No Model.)

G. I. ROOT.

MECHANICAL MOVEMENT.

No. 598,681. Patented Feb. 8, 1898.

Fig. 1.

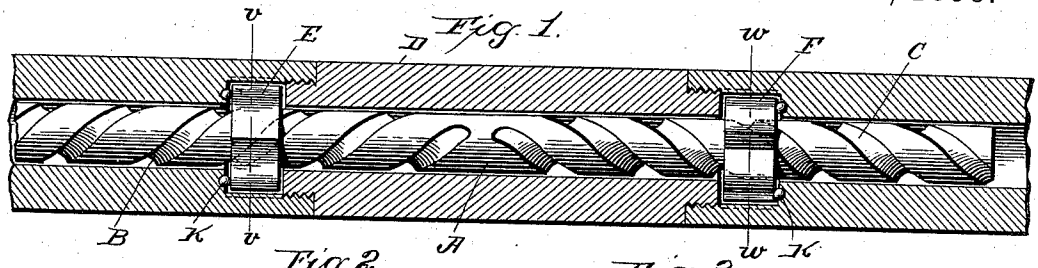


Fig. 2.

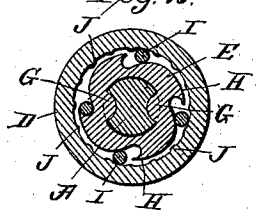


Fig. 3.

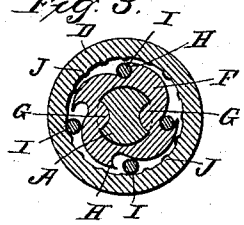


Fig. 4.

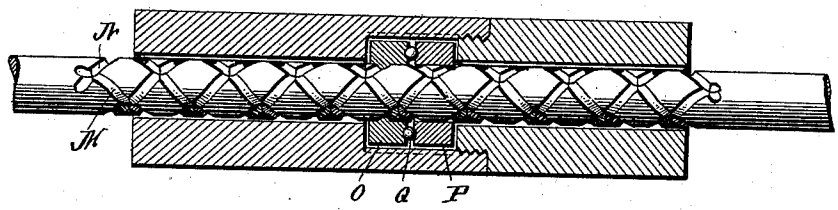


Fig. 5.

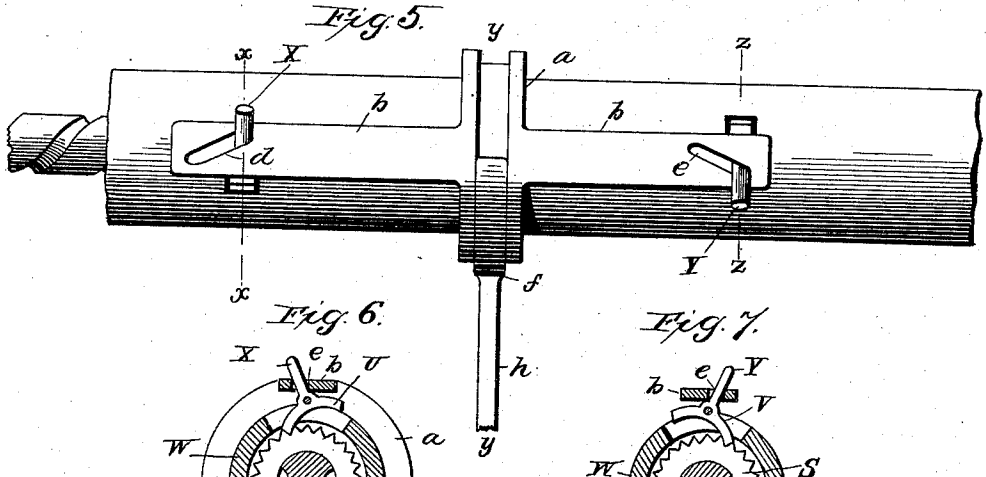
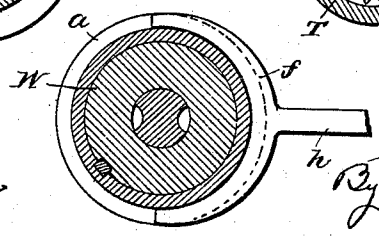


Fig. 6.

Fig. 7.

Fig. 8.



Witnesses
E. C. Dunderman
S. G. Williamson

Inventor
George I. Root
By Geo. A. Holgate
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GEORGE I. ROOT, OF OTTAWA, CANADA.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 598,681, dated February 8, 1898.

Application filed February 17, 1897. Serial No. 623,813. (No model.)

To all whom it may concern:

Be it known that I, GEORGE I. ROOT, a citizen of the United States, residing at Ottawa, in the Province of Ontario and Dominion of Canada, have invented a certain new and useful Improvement in Mechanical Movements, of which the following is a specification.

My invention relates to a new and useful improvement in mechanical movements, and has for its object to provide a simple and effective means by which a reciprocating motion may be converted directly into a rotary motion and is applicable to a large variety of uses, such as the driving of a propeller for marine purposes directly from the reciprocation of the piston-rod of the motor without the intervention of crank mechanism or the like, thereby overcoming the dead-centers which are dependent upon the use of such mechanism, and it may also be adapted for use in small tools and machinery where it is desirable to convert a reciprocating motion into a positive rotary motion in a compact form.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth, and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, its construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a longitudinal section of the outer casing or sleeve, the inner spindle being shown in elevation, of one embodiment of my invention; Fig. 2, a section at the line *v v* of Fig. 1; Fig. 3, a section at the line *w w* of the same figure; Fig. 4, a view similar to Fig. 1, illustrating a slight modification thereof; Fig. 5, an elevation of my improvement when so constructed as to permit the reversing of the action thereof; Fig. 6, a section at the line *x x* of Fig. 5; Fig. 7, a section at the line *z z* of the same figure, and Fig. 8 a section at the line *y y* thereof.

In carrying out my invention as embodied in Figs. 1, 2, and 3 I provide a spindle A, in which are formed two spiral grooves B and C, after the manner of a screw-thread, but cut in opposite directions, so as to cause nuts engaging therewith to revolve one from right to left and the other in the reverse direction. Around this spindle is fitted a sleeve or hollow shaft D, which may be made up of separate sections connected together by screw-threads or otherwise, and within this sleeve or shaft are formed two recesses, in which are fitted the collars or nuts E and F. The nuts have lugs G formed therewith, which are adapted to fit within the spiral grooves, of which there are two in each set, and the peripheries of these nuts have formed thereon ratchet-teeth H, adapted to engage with the rolls I, so placed that when the nuts are revolved in one direction they will have no effect upon this hollow shaft or sleeve, but when being revolved in the other direction the rolls will enter into contact with the lugs J, formed within the recesses in which the nuts are fitted, and cause the hollow shaft to revolve therewith, and since, as before described, one nut will revolve in one direction and the other in the opposite direction when the spindle is reciprocated longitudinally it is obvious that the shaft D will be caused to revolve continuously in the same direction by the action of the two nuts, one of which will turn idly therein when the spindle is being drawn in one direction, while the other is active, and when the movement of the spindle is reversed the action of the nuts will likewise be reversed.

In order to take up any thrust and prevent undue friction, a series of balls K is interposed between the nut E and one wall of the recess in which it is fitted, while a light series of balls L is likewise disposed relative to the nut F. From this it will be seen that should the spindle be connected directly with or itself form an extension of the piston-rod of a steam-engine or other motor and be caused to reciprocate longitudinally the hollow shaft D will be revolved always in one direction, thus imparting to any machinery geared thereto or operated thereby a continuous rotary motion for the performance of the desired work; or should the outer sleeve be connected with or form a part of the piston-rod of a steam or other engine and be caused to reciprocate longitudinally the spiral (if so desired) will revolve always in one direction, thus imparting proper motion to the mechanism or machinery which is being actuated. This arrangement will obviate the necessity for the use of crank or other mechanism for

transposing the reciprocating motion into a rotary motion, as it will at all times impart a positive continuous motion to the driven member.

The modification shown in Fig. 4 contemplates the embodiment of my improvement in a more compact form, and, as there shown, the spiral grooves M and N are located upon the same portion of the spindle, and consequently cross each other; but this will in no wise interfere with operation of the device, since the nuts O and P, while located adjacent to each other, will operate in precisely the same manner as that just described, and in this construction it is preferable that the series of balls Q be interposed between the two nuts, but they may be otherwise disposed, if found desirable. This particular construction is especially adapted for application to small tools, such as screw-drivers, hand-tools, and the like, as the entire mechanism may be arranged within a limited space within the handle of the tool.

When my improvement is used in connection with the propeller-shaft of a boat, it is absolutely essential that means be provided for the reversing of the action of the propeller in order that the boat may be caused to move forward or backward, as desired, and this I accomplish in the construction shown in Figs. 5, 6, 7, and 8 by forming in the peripheries of the nuts R and S a series of ratchet-teeth T, so set that they may be utilized for the engagement of a pawl adapted to operate in either direction, and I pivot the double-ended pawls U and V within the hollow shaft W and provide extensions X and Y for said pawls, respectively, which project in suitable openings in the hollow shaft in order that said pawls may be so operated as to first bring one of their ends into activity and then the other, as may be required. From this it will be seen to reverse the motion of the hollow shaft W, while the reciprocations of the spindle are continued, it is only necessary to reverse the position of the pawls so as to bring their opposite ends into engagement with their ratchets, thereby permitting the nuts to act in a reverse direction upon the shaft, as will be readily understood by those familiar with the action of double-ended pawls and ratchets.

For convenience in reversing the pawls relative to their ratchets and thereby bringing about the reverse rotary movement of the hollow shaft, as just described, a collar *a* is fitted upon the shaft W, so as to slide longitudinally thereon, but prevent it from turning independent of said shaft by being splined thereto, and with this collar are formed extensions *b*, having slots *d* and *e* formed therein, through which the extensions X and Y project, respectively. These slots, as clearly shown in Fig. 5, lie in opposite directions crosswise of the longitudinal axis of the extensions *b*, so that when the collar *a* is moved lengthwise of the shaft in either direction one pawl will be moved in one direction, while the other pawl is moved in the opposite direction, thus reversing the action of said pawls upon their ratchets. The collar *a* has fitted thereto a fork *f*, formed upon the end of the lever *h*, so that by operating this lever the collar may be moved longitudinally while the shaft is in motion, by which arrangement it will be seen that the shaft may be caused to revolve in one direction or the other by a simple manipulation of the lever *h* without stopping or altering the movements of the reciprocating spindle.

My improvement may be advantageously applied to small boats, such as skiffs, by connecting the reciprocating spindle to an oscillating lever under the control of the occupant of the boat, so that when said lever is oscillated the boat would be given a forward progression, or by the reversal of the action of the spindle upon the shaft would be caused to move backward, and such an arrangement would be an advantageous substitution for oars or paddles as now used.

Having thus fully described my invention, what I claim as new and useful is—

1. In a device of the character described, hollow shafting formed in sections, the diameter of the interior of one of the sections being enlarged and the adjacent end of the other section being reduced and inserted part way in the enlarged end of the first-named section, a nut inserted in the enlargement at each joint between the end of one section and the shoulder formed by the enlargement, a spindle having grooves spiraled in opposite directions run through the hollow shaft and rods, said nuts having lugs projecting into the grooves and means on the nuts for causing the shaft to turn in one direction only, and a series of balls interposed between each nut and the shoulder of the shafting, as and for the purpose described.

2. In a device of the character described, hollow shafting formed in sections forming annular grooves in the interior of the shafting at their junction with each other, nuts in the grooves, ratchet-teeth formed in the peripheries of the nuts, double-ended pawls pivoted within the shaft, extensions formed on the pawls projecting through the walls of the shaft, a collar splined on the shaft to slip back and forth, extensions formed with the collar having diagonally-arranged slots formed oppositely, said slots engaging the extensions on the pawls, a spindle having grooves spiraled oppositely therearound and run through the nuts, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of subscribing witnesses.

GEO. I. ROOT.

Witnesses:
S. S. WILLIAMSON,
JOHN CHRISTIE,
HUGH GILLMOR.