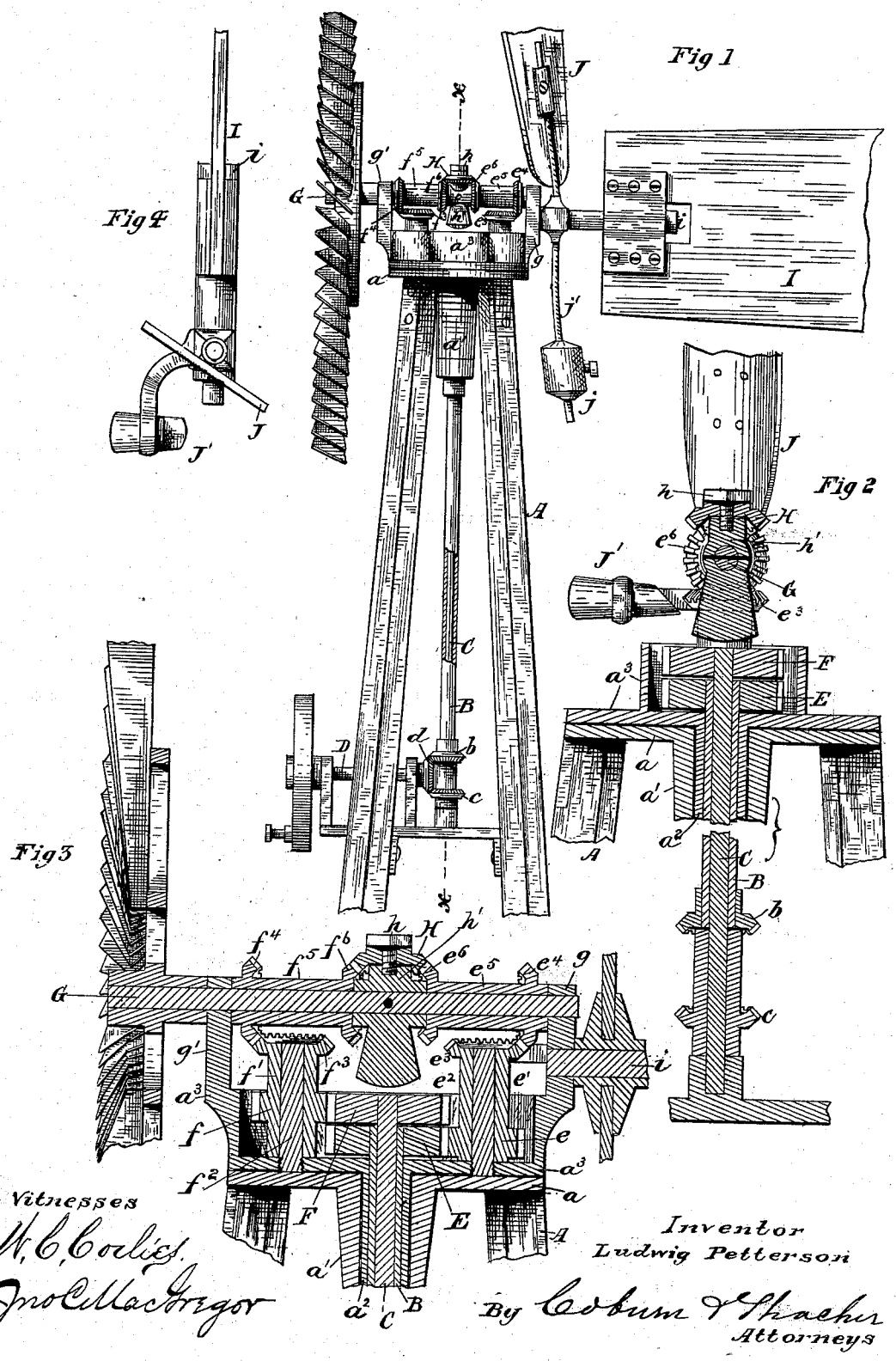
(No Model.)

L. PETTERSON.

DEVICE FOR CONVERTING MOTION.

No. 261,757. Patented July 25, 1882.



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LUDWIG PETTERSON, OF CHICAGO, ILLINOIS.

DEVICE FOR CONVERTING MOTION.

SPECIFICATION forming part of Letters Patent No. 261,757, dated July 25, 1882.

Application filed October 28, 1881. (No model.)

To all whom it may concern:

Be it known that I, LUDWIG PETTERSON, a subject of the King of Norway, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Mechanisms for Converting Motion, which are set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a windmill embodying my improvements; Fig. 2, a transverse section, on an enlarged scale, taken on the line *x x* of Fig. 1; Fig. 3, a vertical longitudinal section, on an enlarged scale, of the upper part of the windmill, portions of the vanes being broken off; and Fig. 4, a top edge view of the vanes and friction-brake.

My invention relates to mechanism for converting two independent rotary motions of a shaft into a single rotary motion, or vice versa.

My invention consists of a pair of shafts concentric with each other and with the pivot on which a third shaft is mounted, which latter shaft causes the two former shafts to rotate in opposite directions relatively to each other.

My invention further consists of a combination, with the above-outlined mechanism, of a fixedly-mounted shaft, to which said concentric shafts are geared.

For the sake of clearly illustrating the utility and mode of operation of my invention, I have shown it in the drawings, and will describe it as it appears when applied to a windmill, though I do not wish to be understood as confining myself to such application of said invention. When thus embodied the doubly-rotating shaft becomes the sail-spindle and its base-plate the windmill-cap.

In the drawings, A represents the main frame of the windmill, on the top plate, *a*, of which is a depending boss, *a'*, surrounding and forming a bearing for the shouldered and hollow pivot a^2 of the windmill-cap a^3. Within this hollow pivot is sheathed the shaft B, itself sheathing the shaft C, which has suitable bearings at its lower end.

On the lower end of the shaft B is keyed a beveled cog-wheel, *b*, which meshes with the beveled cog-wheel *d* on the fixedly-mounted shaft D, and on the opposite side of this wheel *d* is meshed therewith the beveled cog-wheel *c*, which is keyed to the shaft C.

At the upper end of the shaft B is keyed a spur-wheel, E, meshing with the spur-wheel *e*, which forms the lower end of a hollow shaft, *e'*, sleeved on a vertical pivot or shaft, e^2, rising from the cap a^3.

The shaft *e'* terminates at its upper end in a beveled cog-wheel, e^3, meshing with a beveled cog-wheel, e^4, which forms the end of a hollow shaft, e^5, sleeved on the sail-spindle G, and terminating at its other end in a beveled cog-wheel, e^6.

At the upper end of the shaft C, above the wheel E, is keyed a spur-wheel, F, meshing with the spur-wheel *f*, which forms the lower end of a hollow shaft, *f'*, sleeved on a vertical pivot or shaft, f^2, rising from the cap a^3.

The shaft *f'* terminates at its upper end in a beveled cog-wheel, f^3, meshing with a beveled cog-wheel, f^4, which forms the end of a hollow shaft, f^5, sleeved on the sail-spindle G, and terminating at its other end in a beveled cog-wheel, f^6.

The corresponding shafts of these opposite systems of gearing have equal speed.

Between the wheels e^6 and f^6, and meshing with them, is the beveled cog-wheel H, mounted without keying on a pivot, *h*, which projects at right angles from a sleeve, *h'*, keyed to the sail-spindle. The sail-spindle is mounted in standards *g g'*, rising from the cap a^3.

In the standards *g* is horizontally keyed, eccentrically with the sail-spindle, the spindle *i* of the directing-vane I. Attached to the shank of this vane, and projecting at right angles therewith, is the wing J, which is inclined like the sails, but preferably in the opposite direction.

The wing J is kept in a comparatively upright position by the adjustable weight *j*, sleeved on the tail-piece *j'*, which weight, however, is overcome when a very strong wind strikes the wing, the depression thereby of the wing causing the brake-shoe J' to impinge upon the shaft e^5, and rotating the vane on its own axis, so that it presents a plowing or sail-like surface to the wind, which diminishes the resistance of the vane without destroying it.

The operation of my invention is as follows: The rotation of the windmill-cap, were the

wheel H keyed to its shaft, and thus made inoperative, would, if the rotation of the said cap could take place, of course cause a different speed in the concentric shafts relatively to each other from that which they would have when the windmill-cap was stationary; but as the fixedly-mounted shaft is geared to the concentric shafts so as to be operated by them when the windmill-cap is stationary, it is equally a matter of course that the change in the relative speeds of the concentric shafts could not actually take place, and that consequently the revolution of the windmill-cap could not actually take place. Now, as the fixedly-mounted shaft is operated from the sail-spindle through two systems of gearing, and as the desired change in the relative speeds of the concentric shafts is not permitted at the lower junction of these two systems of gearing, such change of relative speeds must be provided for, if at all, at the other—that is, the upper—junction of said systems. Accordingly the wheel H is allowed free revolution on its axis, and thus the system of gearing connecting it with one of the concentric shafts can gain the speed which it is necessary for the counterpart system of gearing to lose in order to allow of the rotation of the windmill-cap.

As the shafts e^5 and f^5 are not keyed to the sail-spindle, it will be obvious that no motion can be imparted to them, except through the sleeve h' and its revolving arm, which constitutes the pivot h of the wheel H, and as the pivot of the wheel H is always positively revolved around its own axis—viz., the sail-spindle—no motion of the revolving sail-frame is lost, whatever apportionment of said motion may be made between the two systems of gearing.

Obviously if the concentric shafts were used to transmit power to separate, continuous, and equal work the fixedly-mounted shaft could be dispensed with without altering the principle of the operation of the wheel H and those of the connections which have been above referred to in explaining the operation of my invention.

When the brake-shoe impinges upon the shaft e^5 with sufficient force the wheel e of course stops rotating, and the wheel E is forced to revolve, notwithstanding the speed-apportioning function of the wheel H by its connection with the wheel d.

As the wheels E and e interlock, and as the former revolves while the latter does not, the latter must revolve around the axis of the former. In order to do this, it must carry with it the windmill-cap, on which it is mounted, the pivot of the cap being concentric with that of the wheel E.

When the brake-shoe impinges upon the shaft e^5 and the cap is rotated, as just explained, the vane is thrown with an ever-increasing leverage against the wind, the result being that the vane, before reaching a position at right angles to the wind, furnishes a resistance to the rotation of the cap which more than counterbalances the effect of the brake, the wing of which presents an ever-decreasing resistance, thus compelling the wheel e, which is locked with the ever-rotating wheel E, itself to rotate. Between the points at which these opposing forces overcome each other the cap vibrates, presenting the sail-frame obliquely to the wind for the purpose of diminishing the sum total of the resistance on the sails.

Obviously the power and the work may be connected with my device for converting motion at ends of said device opposite to those to which they are connected in the windmill above described.

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

1. The combination of the shafts B and C with the spindle G, pivoted concentrically with said shafts and operating them through mechanism connected to said spindle on opposite sides of its pivot, substantially as set forth.

2. The combination of a pair of concentric shafts, a pair of bevel-wheel sleeves, e^5 and f^5, for operating said shafts, and the wheel H, substantially as set forth.

3. The combination of a fixedly-mounted shaft, D, a pair of concentric shafts, a pair of bevel-wheel sleeves, e^5 and f^5, for operating said concentric shafts, and the wheel H, substantially as set forth.

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