(No Model.) 2 Sheets—Sheet 1.

G. S. EASTMAN.

WIND ENGINE.

No. 443,641. Patented Dec. 30, 1890.

Fig. 1.

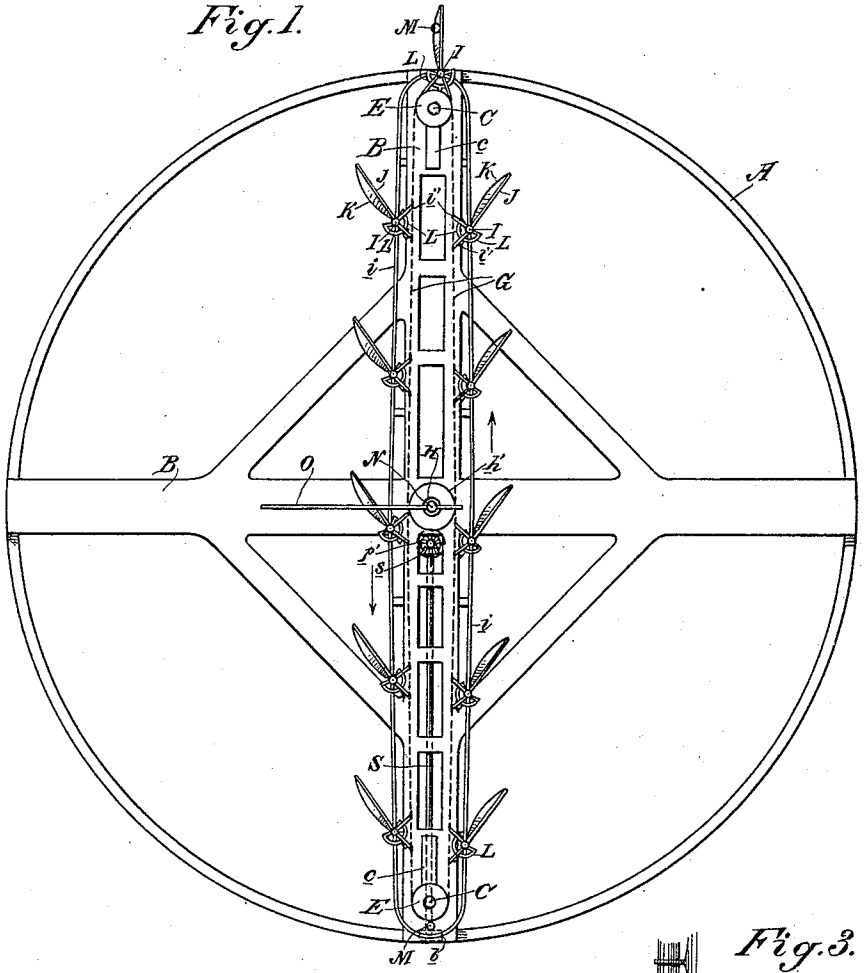


Fig. 2.

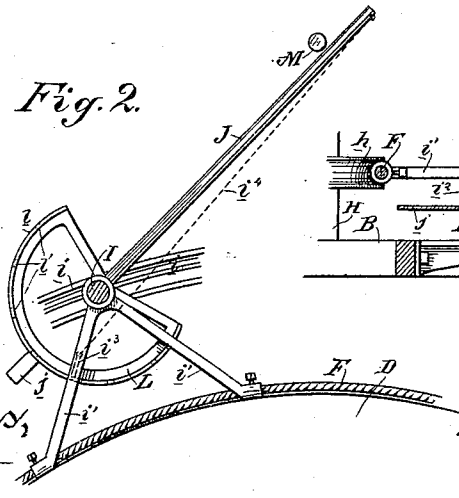
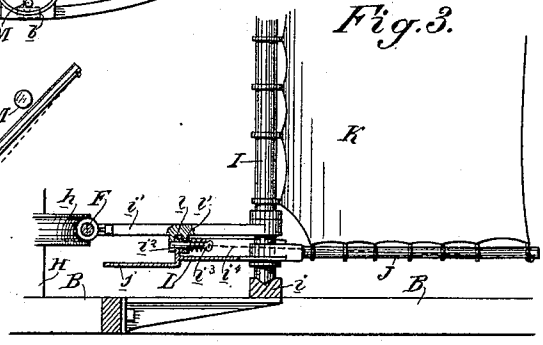


Fig. 3.



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

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

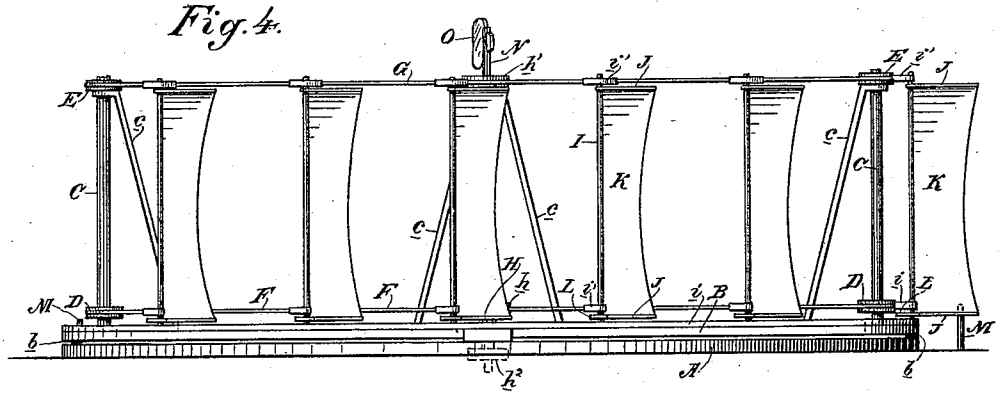


Fig. 5.

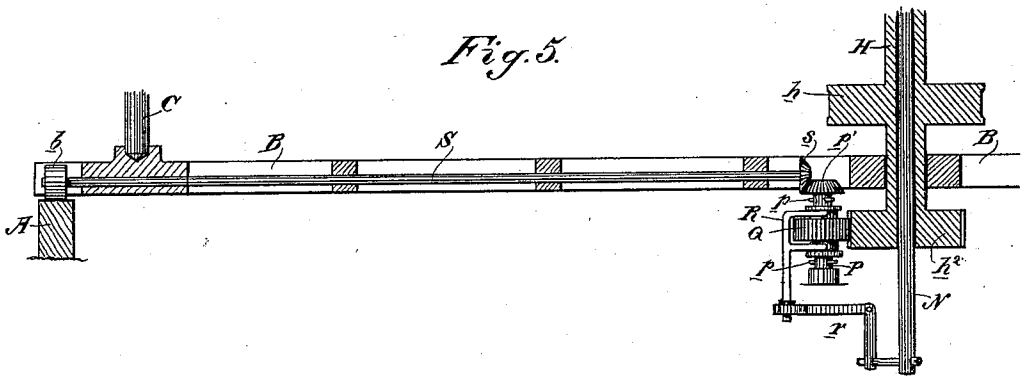
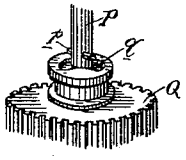


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE SOLOMON EASTMAN, OF SAN FRANCISCO, CALIFORNIA.

WIND-ENGINE.

SPECIFICATION forming part of Letters Patent No. 443,611, dated December 30, 1890.

Application filed July 18, 1890. Serial No. 359,205. (No model.)

To all whom it may concern:

Be it known that I, GEORGE SOLOMON EASTMAN, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Wind-Engines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of machines adapted to be driven by the wind; and it consists in the novel constructions and combinations hereinafter fully set forth, and specifically pointed out in the claims.

The object of my invention is to provide a wind-engine capable of developing a great amount of power to be used for driving other machinery.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a plan of my wind-engine. Fig. 2 is a detail plan showing the connection of the mast to the cable and the boom to the mast. Fig. 3 is an elevation of the boom-locking mechanism. Fig. 4 is an elevation of my engine. Fig. 5 is a view of the mechanism for keeping it in the wind. Fig. 6 is a view of pinion Q to show how it is thrown into engagement with shaft P.

A is the turn-table, consisting of a suitable bed provided with a circular track. Upon this turn-table is mounted a turn-frame B, consisting of cross-beams properly secured together, the ends of one of said beams having rollers or wheels *b*, which travel on the track of the turn-table.

C are vertical shafts, the lower ends of which are suitably stepped in bearings on the ends of one of the beams of the turn-frame B, and their upper ends are journaled in the tops of upright braces *c*, rising from the frame B. Upon the lower ends of these vertical shafts C are pulleys D, and upon their upper ends are pulleys E.

F is an endless band, cable, or chain which passes around the pulleys D. G is a similar endless band, cable, or chain which passes around the pulleys E.

Suitably journaled in the center of the frame B is the upright driven shaft H, having at its lower end a pulley *h* and at its upper end a pulley *h'*.

The endless bands, cables, or chains F and G pass in contact and in engagement with the pulleys *h* and *h'*, which are of a character adapted to effect the engagement of said bands, cables, or chains, according to their character. For example, if the parts F and G be endless chains, the pulleys *h* and *h'* will be sprocket or chain pulleys, which are directly engaged by the chains F and G, so that the travel of said chains will impart a rotary motion to the pulleys *h* and *h'*, and through them to the shaft H, from which the power of the machine may be taken to drive any suitable machinery.

Extending between and properly connected with the bands, cables, or chains F and G are the vertical masts I in series and in any proper number. The lower ends of these masts extend downwardly below the band, cable, or chain F, and are adapted to travel upon a fixed guide-track *i* below, whereby they are prevented from sagging. Each of these masts is provided with hinged booms J—one above and one below—and to these booms are secured the sails K, having any suitable shape, here shown as being substantially the shape of the mainsail of a vessel. The masts I are secured to the endless bands, cables, or chains by means of bracket-arms *i'*, in the outer ends of which said masts are secured. Connected with the inner end of each lower boom J is a quadrant L, having an upright flange *l*, provided with a number of holes *l'*. On the arms *i'* are guide-flanges i^2, which form housings, in which the quadrant-flange *l* moves, and mounted in one of these guide-flanges is a spring-projected and controlled lock-bolt i^3, which is adapted to engage the holes *l'* in the quadrant-flange. A chain or rope i^4 is connected with the head of this locking-bolt and extends to and is connected at its other end with the outer end of the lower boom J.

Fixed at each end of the machine are the stops M, which lie in the path of travel of the lower booms J at one end and of extensions *j* thereof at the other end.

Upon the lower end of the central or driven shaft H is a gear h^2, and said shaft is made hollow to receive a turn-rod N, the upper end of which projects above the shaft and carries a regulating-vane O. The lower end of the turn-rod N projects through the driven shaft H.

Secured to and extending downwardly from the turn-frame B is a short shaft P, which carries a pinion Q, mounted loosely upon it and engaging the gear h^2 of the driven shaft. The upper and lower ends of this pinion are notched, as shown at q, and through the shaft P extend cross-pins p, with which the notches q of the pinion-hub are adapted to engage when said pinion is raised or lowered. These devices form an upper and a lower clutch for connecting the pinion with the shaft when raised or lowered, so that the power of the driven shaft will be transmitted to said shaft P. This movement of the pinion up or down is effected by means of a clutch-arm R, engaging the pinion-hub and operated through suitable lever-connections, (designated by r,) and connected with the turn-rod N, which carries the regulating-vane O. The upper end of the shaft P carries a bevel-pinion p', which meshes with a beveled pinion s on the inner end of a shaft S, the outer end of which carries one of the wheels b, which support the turn-frame B of the machine.

The operation of the machine is as follows: The wind, striking the sails K, causes the endless bands, chains, or cables F and G to travel, and their engagement with the pulleys h and h' transmits rotation to the driven shaft H. When the sails reach one end of their course of travel, their lower booms J come in contact with the fixed stop M at that end whereby the boom is turned. The initial movement of the boom pulling upon the chain or rope i' withdraws the locking-bolt i^3 from the quadrant L of the boom, so that the boom is free and the sail is turned around to a position enabling it to return on the other side in the wind, and as it reaches this new position the chain or rope i' being relieved again by the passage of the boom past the center the locking-bolt i^3 springs automatically into fresh engagement with the boom-quadrant L, thereby holding the sail in its new position. In such position it returns with the wind on the other side until it reaches the first end of the machine, where its boom extension j coming in contact with the other stop M, the locking-bolt is once more withdrawn and the boom is turned around to its first position with the sail in the wind, and said boom is once more locked in this first position. Now, to keep the whole machine in the wind, the regulating-vane O is operated upon by the wind, thereby turning the rod N, and through the connections r raising or lowering the pinion Q, so as to throw it into gear with the shaft P, said shaft thereby receiving the power of the driven shaft H and transmitting it through the beveled pinions p' and s to rotate shaft S and turn the wheel b, so that the whole frame B turns into position to throw the sails into the wind.

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

1. In a wind-engine, the combination of a turning frame, an endless band, cable, or chain, suitable pulleys on said turning frame by which said band, cable, or chain is carried and guided, and sails attached to said band, cable, or chain for causing its travel, substantially as herein described.

2. In a wind-engine, the combination of a turning frame, an endless band, cable, or chain, suitable pulleys on said turning frame for supporting and guiding said band, cable, or chain, a driven shaft engaging said band, cable, or chain to receive its power, and sails attached to the band, cable, or chain, whereby it is caused to travel, substantially as herein described.

3. In a wind-engine, the combination of a turning frame, an endless band, cable, or chain, pulleys on said turning frame for supporting and guiding it, a driven shaft engaging it and receiving its power, swinging sails connected with it for effecting its travel, and means at each end for swinging the sails into the wind, substantially as herein described.

4. In a wind-engine, the combination of a turning frame, an endless band, cable, or chain, suitable pulleys on said turning frame for supporting and guiding said band, chain, or cable, a driven shaft engaging the band, cable, or chain for receiving its power, swinging sails connected with it for causing its travel, fixed stops at each end for swinging the sails into the wind, and a locking device for holding the sails in position, substantially as herein described.

5. In a wind-engine, the combination of a turning frame, an endless band, cable, or chain carried by suitable pulleys on said turning frame, a driven shaft engaging said endless band, cable, or chain and receiving its power, sails carried by it for causing its travel, a regulating-vane, and connections between said vane and the turning frame whereby the machine is kept in the wind, substantially as herein described.

6. In a wind-engine, the combination of a turning frame with wheels, an endless band, cable, or chain carried by suitable pulleys on said frame, a driven shaft operated by the band, cable, or chain, sails connected with it for causing its travel, a regulating-vane, a turn-rod carrying said vane, a shaft P, carried by the turning frame, the shaft S, carrying the wheel of said frame and gearing between said shafts, the loose pinion on shaft P, geared to the driven shaft, a clutch for throwing said pinion into and out of gear with shaft P, and connections between said clutch and the turn-rod of the regulating-vane, substantially as herein described.

7. In a wind-engine, the combination of the upright end shafts C, having pulleys above and below, the endless bands, cables, or chains F and G, mounted upon said pulleys, the central driven shaft H, having pulleys engaging the endless bands, cables, or chains, whereby said shaft is rotated, the masts I, secured to and between said endless bands, cables, or

chains, and the sails K, carried by the masts, substantially as herein described.

8. In a wind-engine, the combination of the end shafts C, having the upper and lower pulleys, the endless bands, cables, or chains carried by said pulleys, the central driven shaft H, having pulleys engaging the bands, cables, or chains, whereby said shaft is rotated, the vertical masts secured to and carried by the chains, the swinging booms mounted upon the masts, and the sails secured to the booms, substantially as herein described.

9. In a wind-engine, the combination of the vertical end shafts C, having the pulleys, the endless bands, cables, or chains carried by said pulleys, the central driven shaft H, having the pulleys engaging the endless bands, cables, or chains, the vertical masts I, secured to the bands, cables, or chains, the booms pivoted upon the masts, the fixed stops M at each end of the machine for turning the booms and throwing the sails into the wind, and a locking device for holding them in position, substantially as herein described.

10. In a wind-engine, the combination of the endless bands, cables, or chains, the bracket-arms secured to and extending therefrom, the vertical masts carried by the bracket-arms, the booms pivoted on the masts, the quadrants L of the lower booms having the flanges with holes, the spring-controlled locking-bolts i^3, mounted in the bracket-arms and adapted to engage the holes of the quadrants, the chains or ropes i^4, connecting the locking-pins with the outer ends of the lower booms, and the fixed stops M, with which said booms come in contact, substantially as herein described.

11. In a wind-engine, the turn-table, the turn-frame having wheels traveling on the turn-table, the vertical end shafts of the turn-frame having the pulleys, the endless bands, cables, or chains supported and guided by said pulleys, the central hollow driven shaft H, having pulleys engaging the endless bands, cables, or chains, the masts I, connected with said bands, cables, or chains, the sails K, carried by the masts, and the means for keeping the sails in the wind, consisting of the regulating-vane O, the turn-rod carrying said vane and extending through the central driven shaft, the shaft P, carried by the turn-frame, the shaft S, carrying one of the wheels of said turn-frame and geared to the shaft P, the loose pinion Q on said shaft P and the gear on the central driven shaft engaging said pinion, and a clutch mechanism operated by the turn-rod for throwing the loose pinion into and out of gear, substantially as herein described.

In witness whereof I have hereunto set my hand.

GEORGE SOLOMON EASTMAN.

Witnesses:
S. H. NOURSE,
H. C. LEE.