

J. C. SALA & G. STABILE.
WINDMILL.

(Application filed Oct. 23, 1901.)

(No Model.)

2 Sheets—Sheet 1.

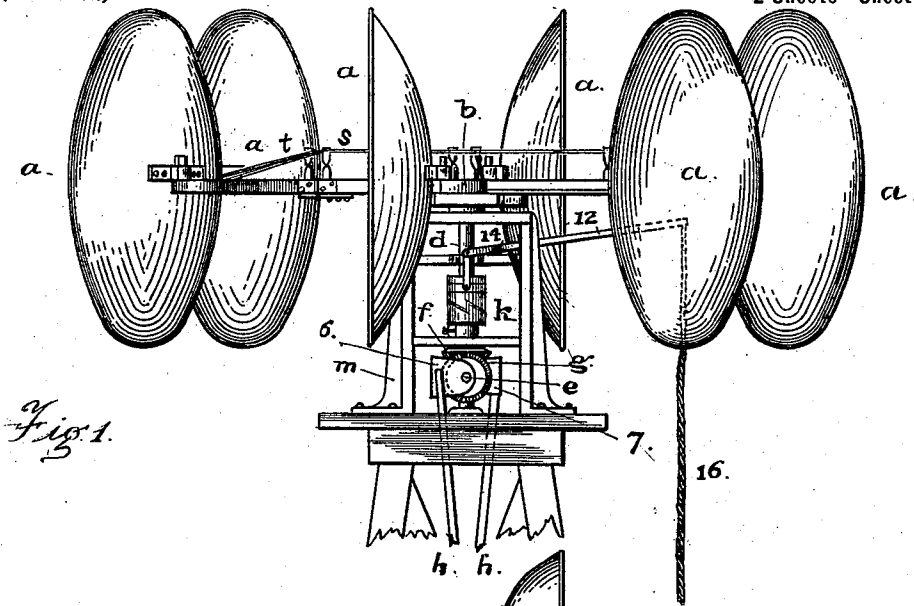


Fig. 1.

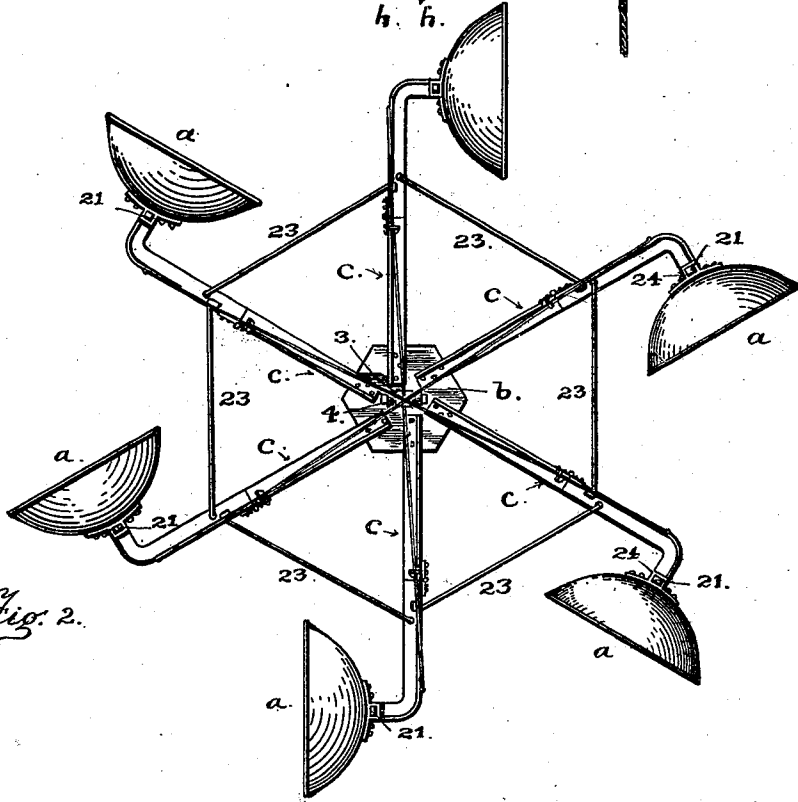


Fig. 2.

Witnesses.
Arthur L. Lee.
A. Regan

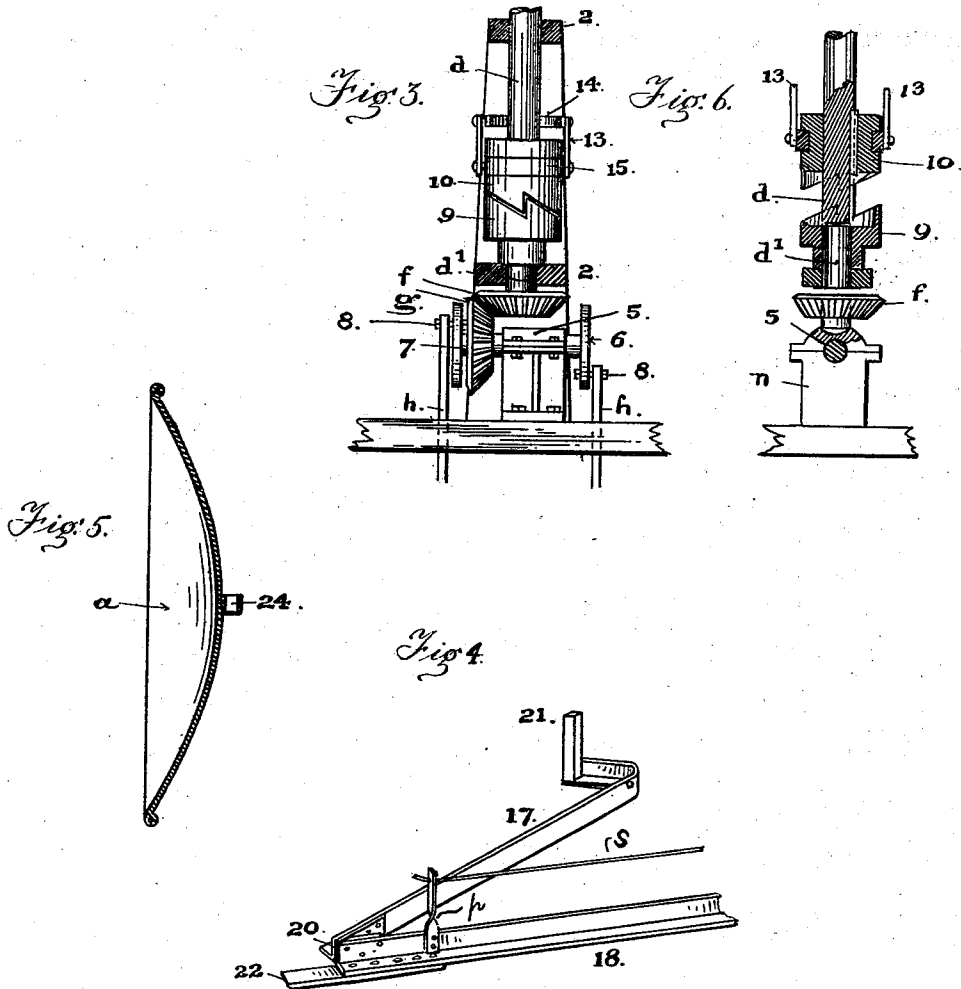
Inventors
Joseph C. Sala
Giuseppe Stabile
By E. J. Gordon ATT

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Witnesses.
 Arthur S. Sla.
 A. Regner.

Inventors
 Joseph C. Sala,
 Giacchino Stabile
 By E. E. Osborn Atty.

UNITED STATES PATENT OFFICE.

JOSEPH C. SALA AND GIOACCHINO STABILE, OF SAN FRANCISCO,
CALIFORNIA.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 692,714, dated February 4, 1902.

Application filed October 23, 1901. Serial No. 79,655. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH C. SALA and GIOACCHINO STABILE, citizens of the United States, and residents of the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Windmills, of which the following is a full, clear, and exact description, reference being had therein to the accompanying drawings, forming part of this specification.

In the following description of the manner of carrying out and producing our invention the said drawings are referred to as follows:

Figure 1 is a front elevation of that part of the windmill usually termed the "wheel" and the mechanism through which the revolutions of the wheel are converted into reciprocating motion to drive the pump. Fig. 2 is a top plan of the wheel. Fig. 3 is a side elevation, in detail and on an enlarged scale, of the reciprocating mechanism and the device for throwing off and on the power. Fig. 4 is a perspective view showing in detail the construction of the folding arms. Fig. 5 is a longitudinal section through the center of one of the vanes.

In the drawings and in the following description the principal parts are designated and referred to as the vanes *a*, head *b*, folding arms *c*, upright driving-shaft *d*, driven shaft *e*, gearing *f g*, pitmen *h*, clutch *k*, and tower or frame *m*, in which the two shafts are supported on the top of the wooden framework that elevates the wheel at a proper height above the ground. Usually this framework is formed of upright timbers *p*, properly tied and braced by stringers *s* and braces *t*, as shown in Figs. 1 and 4.

The present invention relates to windmills of that class or description in which the wind-propelled wheel is arranged to travel in a horizontal plane; and it has for its object to produce certain improvements in the construction of the wind-wheel and in the means connecting the same with the pump and in the mechanism for throwing the wheel in and out of operation.

To such end and object the improvements consist in a mill or device constructed substantially as hereinafter more fully described and claimed.

The upright shaft *d* is formed in two parts or sections, as shown in the drawings, and is provided with bearings 2 2 in the frame *m*, and on its upper end projecting above the top bearing is fixed the head *b*, the end of the shaft being squared to fit a hole 3 of corresponding shape in the center of the head. A cross-pin 4, inserted through that end of the shaft, prevents the head from being lifted off the end of the shaft. On the lower section of this shaft *d* is fastened a horizontal gear of a pair of bevel-gears *f g*, that connect the horizontal shaft *e* with the upright shaft. A bearing 5 for the horizontal shaft is provided on an independent bearing-block *n*, and on the opposite ends are fixed two arms 6 7, diametrically opposite to each other or at one hundred and eighty degrees apart. To each arm is attached a pitman *h* by a crank-pin 8, so that the two pitmen, being driven by the same horizontal shaft, are made to counterbalance each other when in motion. The gear *g* is keyed on the horizontal shaft; but the other gear *f* of the pair is connected to the upper member of the upright shaft through the medium of a two-part clutch, composed of a collar 9, to which the gear *f* is secured, and a similar collar 10, fitted to slide on the upper shaft, so as to connect with and be disconnected from the other clutch-collar 9 on the lower member of the shaft by a sliding movement; but at the same time it is attached to the shaft by a groove and spline to turn with the shaft. The sliding movement to engage and disengage these two clutch members is effected by a lever 12, fulcrumed in a support on the frame and connected at one end by a fork 14, attached to a loosely-fitting ring 15 on the clutch-collar 9 by links 13, so as to allow that member to turn with the shaft. A support for the fulcrum of lever 12 is formed by a bracket secured to the frame at 21. To the longer arm of the lever, that extends beyond the fulcrum, is attached a cord 16 for operating the clutch from the ground, so that it is unnecessary to ascend the tower when it is desired to stop or to start the windmill. By pulling on the cord the clutch member 9 will be raised from the clutch member 10 and the two may be held apart by taking a hitch around the chest on the framework.

Ordinarily the weight of the clutch member 9 will be sufficient to connect it with the remaining member when the cord is released, and thus the use of a spring to throw the parts of the clutch into engagement is not required. Each arm is composed of two members 18 and 17, united by a hinge-joint 20, one of which is fastened at the end rigidly to the head *b*, while the other member is provided or formed with an upwardly-turned post 21 of rectangular shape in cross-section. This last-mentioned member is made or arranged to fold back horizontally upon the fixed member, and both members are preferably constructed of angle-iron, by which proper strength and stiffness is secured with a minimum of weight of metal to support the weight of the outer member and its vane, and thereby relieve the hinge of the same. A flanged plate 22 is riveted to the under side of the fixed or inner member 18, so as to extend across the joint and under the bottom of the outer member 17. In that position the projecting piece allows the hinged member to turn back on the joint when the parts are folded together, while it removes all strain on the hinge when the parts are set in line. The arms are connected one to another around the circle by tie-rods 23, so as to join them stiffly together in one structure and also relieve the hinged members of all lateral strain due to wind-pressure against the vanes on the outer ends. The rods are attached to the arms by bending or shaping the ends of the rods and inserting them in holes provided in the arms. The vanes *a* are oval dish-shaped disks fixed on the ends of the arms by means of a socket 24 on the back or convex side of the vane, having a square hole to receive the post on the end of the arm. The vanes are set in upright position, with their concave sides facing in the same direction around the circle and having the major axis of the oval standing vertically. The proportion of the length or major axis to the width or minor axis of the vane is approximately twice the length of the minor axis, and the concavity being deepest at the intersection of the two axes is reduced regularly in the direction of both axes out to the rim, giving the vane a shallow dish-shaped form. A cross-section on the line of either axis will be less than a semi-circle. This form of vane, in conjunction with the position in which it is fixed on the carrying-arm, enables a large vane to be carried by a relatively light arm, because the greater length of the vane being disposed perpendicularly to the arm its weight, as well as the length of the surface receiving the wind-pressure, does not throw upon the hinged member of the arm at the joints an increased strain either in a perpendicular or in a lateral direction. A vane of this form has the additional advantage of presenting the least

surface of resistance when passing out of the wind and also when turning edgewise and passing into the wind.

Two cranks and a pitman are provided for working two pumps, and these are set and connected at one hundred and eighty degrees apart, so that the weight of one pump-rod in descending acts as a counterbalance to the weight of the other rod and the load of water being lifted, thereby producing a smooth and even action of the mill.

The parts of this mill are few in number and are specially designed and combined to avoid complicated mechanism and a multiplicity of working parts.

A mill of this construction can be put together and set up for operation by any person familiar with the use of tools without requiring special mechanical skill. It can be packed in small compass for transportation. It is also readily kept in repair.

Having thus fully described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

1. The herein-described windmill, comprising a suitable frame, an upright driving-shaft, a head, radial arms fixed thereto, braces uniting the arms, oval disk-shaped vanes secured to the ends of the arms with the longer axes of the vanes perpendicular to the arms, a horizontal shaft having crank-arms on the ends set diametrically opposite to each other, a pitman connected to the crank-arm, a beveled gear fast on the crank-shaft, a bevel-gear loose on the upright shaft, a two-part clutch connecting that bevel-gear to its shaft, and a clutch-lever.

2. In a windmill, a wind-wheel comprising a head, radial arms secured thereto at points around the circle, said arms being composed each of a member rigidly secured to the head, and a member attached to the rigid member by a hinged joint, a supporting-plate on the member extending under the hinge, and detachable brace-arms connecting the outer hinged members together.

3. In a windmill, a wind-wheel comprising a head mounted for rotation on an upright shaft, a plurality of arms secured to the head in radial position around the circle, and a vane on the end of each arm composed of an oval dish-shaped disk having its longer axis set upright and perpendicular to the arm, said disks being in cross-section less than a semi-circle on the line of the longer and shorter axes.

In testimony whereof we have signed our names in the presence of two subscribing witnesses.

JOSEPH C. SALA.
GIOACCHINO STABILE.

Witnesses:
GEO. T. KNOX,
EDWARD E. OSBORN.