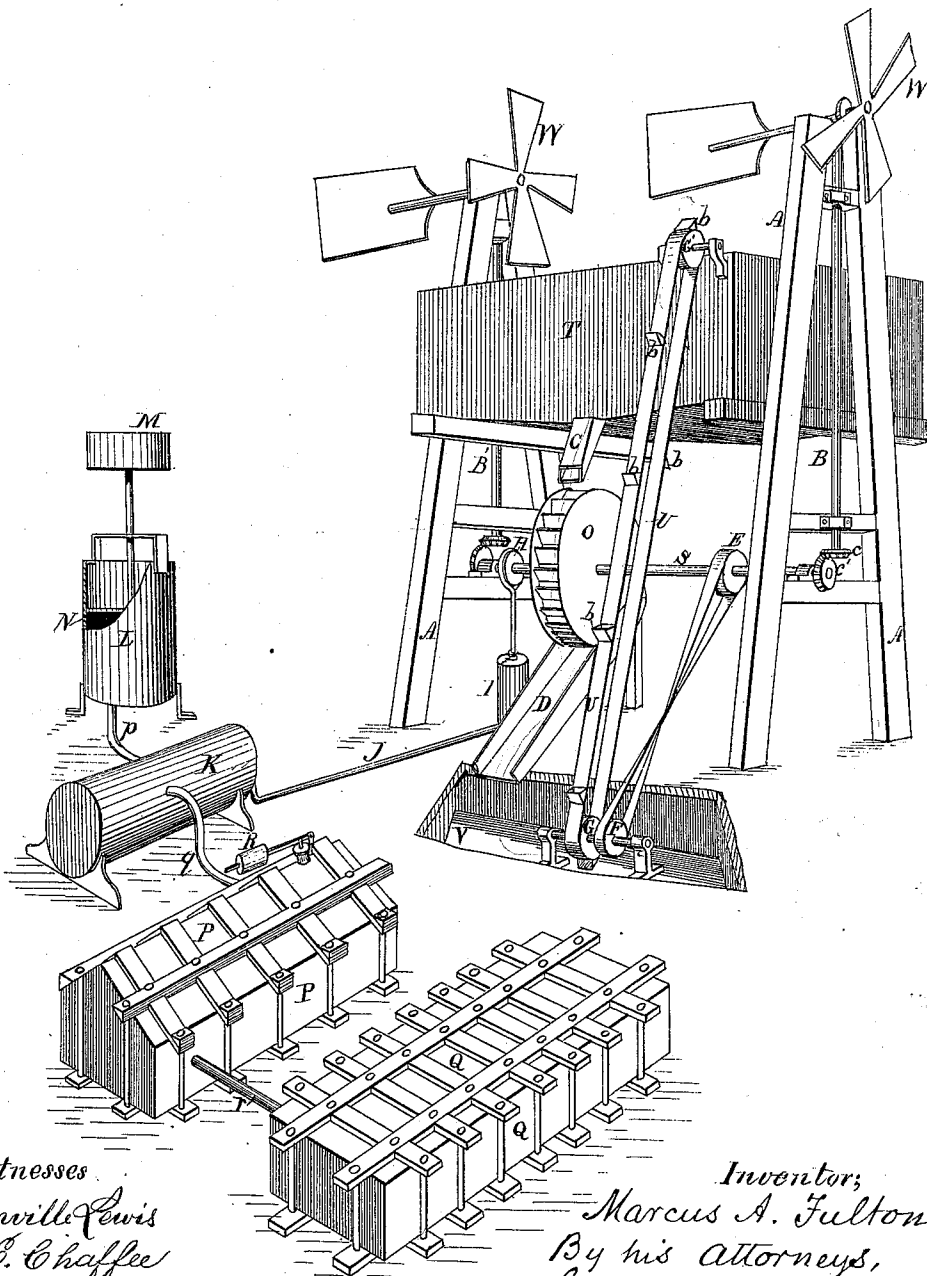


M. A. FULTON.

APPARATUS FOR COMPRESSING AIR BY WIND POWER.

No. 177,495.

Patented May 16, 1876.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN APPARATUS FOR COMPRESSING AIR BY WIND-POWER.

Specification forming part of Letters Patent No. **177,495**, dated May 16, 1876; application filed March 29, 1876.

To all whom it may concern:

Be it known that I, MARCUS A. FULTON, of the city of Hudson, in the State of Wisconsin, have invented a new and Improved Apparatus for Compressing Air by Wind-Power; and I do hereby declare the following to be a full and correct description of the same, reference being had to the accompanying drawings, in which is a perspective view of an apparatus embodying my invention.

The nature of my invention consists in a system and apparatus for storing wind-power by converting it, both directly and indirectly, into another form of force, which can be applied to the performance of mechanical work at any time, whether the wind be blowing or not.

I effect the desired result by receiving the power of the wind upon wind-wheels of any suitable construction, and causing the motion of said wheels to be transmitted directly to air-pumps, which force air in a condensed state into reservoirs, whence it can be drawn, when required, to drive an air-engine, and, at the same time, applying the surplus power of the wind-wheels to carrying up sand, or other suitable substances, whose particles move readily upon one another, into an elevated tank or receptacle, whence, in descending, the substance thus raised may be made, by its weight, to turn a wheel when the wind is not blowing, and work an air-pump connected with a condensed air-reservoir of any suitable form, the power, in both cases, being immediately or ultimately converted into the elastic force of air, and applied to operate an air-engine, all as hereinafter more fully set forth.

I am aware that the mere storing of the power of wind by raising weights is not new; but I believe that the direct use of the power to work a condensing air-pump, and the employment at the same time of any surplus power to create a reserve, which can be used at pleasure for the same purpose as the directly-applied power, after the wind has ceased to blow, constitutes a new and useful invention, especially adapted to the wants of a large portion of our prairie country, where the wind blows with remarkable constancy, where windmills are already extensively introduced, and where the scarcity of fuel makes it very desirable that a power should be avail-

able which does not depend upon artificial heat for its development.

The drawing illustrates a form of apparatus in which my invention is embodied.

Wind-wheels W W, of any usual construction, are supported upon suitable framework A, which also supports large elevated tank T. The wheels W, by suitable gearing, drive shafts B B', and these communicate motion to shaft S, which, by means of any number of cams H, drives a corresponding number of air-condensing pumps, I, connected by pipes J with condensed-air reservoirs of proper form, size, and construction. From these reservoirs, when suitably charged, the condensed air is drawn to drive a condensed-air engine. To shaft S is attached a pulley, E, which, by a belt, drives pulley F, to whose shaft another pulley, G, is attached. An endless belt, U, provided with elevator-buckets *b*, passes around pulleys G and G', the latter being placed near the edge of the tank T. The pulley G is located in a vat, V, supplied with loose dry sand. As the shaft S revolves the elevator-buckets *b* carry up sand from the vat V, and deliver it in the tank T. This tank has its bottom inclined from every side toward the mouth of chute C, which is controlled by a gate or valve. The chute C has its lower opening directly above the overshot-wheel O, which is attached to shaft S. A trough, D, leads from the lower side of wheel O to the vat V to convey to that receptacle the sand, &c., discharged from the buckets of wheel O. The condensed-air reservoirs may be of any form, size, and number that may be found most desirable. Several forms are represented in the drawing. L is an upright cylinder, having a close-fitting piston, N, which is raised by the entrance of condensed air through pipe *p*, and depressed, when the internal pressure is relieved, by the heavy weight M, which entirely expels the air from the cylinder as it descends. P and Q are wooden reservoirs of large size, strongly built, braced, and strapped without, and lined with impervious materials within, so as to be perfectly air-tight. The reservoir P is provided with a safety-valve as a security against explosion, and each reservoir has a check-valve to allow air to enter from the pumps, or from

an adjoining reservoir, and prevents its escape or return. A number of reservoirs may be connected together; and in that case the connecting-pipes *q r*, &c., should be provided with automatic valves, so loaded as to compensate for the diminishing pressure in that reservoir of the series from which air is drawn to propel the engine. *K* is the distributing-reservoir, into which air is driven directly from the pumps, and whence it passes into the storing-reservoirs.

The operation is as follows: When the wheels *W* are turned by the wind, motion is communicated to shaft *S*, which, by means of eccentric *H*, drives the air-pump *I*, and supplies the various reservoirs with which it is connected with condensed air. If the force of the wind is such as to afford a surplus of power beyond what is required to work the pump, the belt *U*, with its buckets *b*, is thrown into gear, and the elevator-buckets carry up sand from vat *V*, and deposit it in the elevated tank *T*, and the operation continues as long as the force of the wind is sufficient to perform it. When the wind ceases to blow the chute *C* is opened, and the sand stored in tank *T* falls upon wheel *O*, and rotates the shaft *S*, which thus continues to drive the air-pump as long as the supply of sand in the tank holds out. Thus the shaft *S* and the air-pump or pumps *I* are driven first by the direct action of the wind, and, when the wind lulls, by the stored surplus power exerted by it when blowing.

Having thus described my invention, what I claim is—

1. In combination with one or more wind-wheels, *W*, and a main shaft, *S*, driven by them, the condensing-pump *I*, driven from shaft *S*, the belt *U* and its elevator-buckets driven from the same shaft, all constructed, arranged,

and operating substantially in the manner and on the principal described and explained.

2. In combination with shaft *S*, the bucket-wheel *O*, driven by sand, or other material, falling upon it from tank *T*, and driving the said shaft intermittently or simultaneously with the wind-power, as and for the purpose set forth.

3. In combination with a wind-wheel, mechanism, substantially as described, driven by it, whereby the wind-power received by the wheel, or as much thereof as may be needed, is applied directly to the driving of one or more pumps for condensing air in proper storing-reservoirs, while, at the same time, any surplus of such power is used in raising sand, or other material, to an elevated receptacle, whence the substance so raised may be stored till needed, and then be made, in descending, to drive by its weight a wheel connected with an air-condensing apparatus, and continue its operation after the wind has ceased to blow, all substantially in the manner and for the purpose set forth.

4. In combination with a wind-wheel, mechanism, substantially as described, for the double application of the wind-power, whereby part of the power may be used directly in the condensation of air, and the remainder be employed in the storing of power for the continuation of the condensing operation after the wind has ceased to blow, all substantially in the manner and for the purpose specified.

The above specification of my said invention signed and witnessed at Washington this 10th day of March, A. D. 1876.

MARCUS A. FULTON.

Witnesses:

JOS. T. K. PLANT,

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