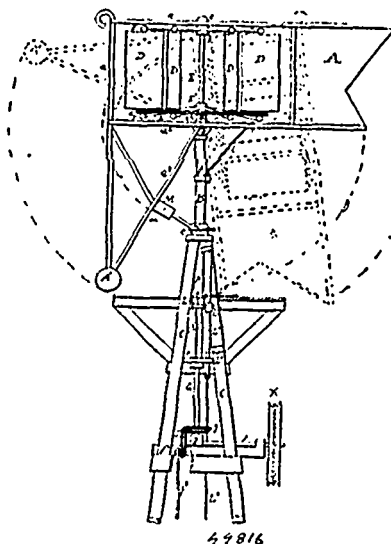


the exhaust steam cylinder having a relatively larger capacity than the other cylinder, the vacuum elevated solid piston heads arranged to work in both cylinders, a live steam pipe connected with the live steam cylinder, an exhaust steam pipe connecting both cylinders, to carry the exhaust steam from the live to the exhaust steam cylinder and automatically operated valve devices for the live steam and exhaust pipes to provide for simultaneously cutting off the supply of live steam and opening up communication between both of the cylinders, substantially as set forth. 2d. In a steam engine, the upright live and exhaust steam cylinders having lower open ends, the exhaust steam cylinder having a relatively larger capacity than the other cylinder, the solid piston heads arranged to work in both cylinders, the piston head in the larger cylinder being weighted to provide for carrying the same to the limit of its downstroke, a live steam pipe connected with the smaller live steam cylinder, an exhaust pipe connecting the two cylinders, a condenser and air pump pipe connected with the upper end of the exhaust steam cylinder, automatically operated valve devices for the live steam and exhaust pipes to provide for cutting off the supply of live steam and opening communication with both cylinders at one and the same time, and an automatically operated valve for said condenser and air pump pipe, substantially as set forth. 3rd. In a steam engine, the combination of the upright live and exhaust steam cylinders having lower open ends, the exhaust steam cylinder having a larger capacity than the other cylinder, the pistons arranged to work within the cylinders, the horizontal drive shaft supported to rotate below the cylinders and having a crank-wheel at one end, the pitman connected to said piston heads, the pitman of the live steam cylinder being connected with said crank-wheel, a pawl and ratchet connection between the other pitman and the shaft, a cam disc mounted on said shaft and provided with a trip shoulder, the live steam pipe connected with the upper end of the live steam cylinder and having a valve casing, a winged cut off valve arranged to work within the valve casing and having a stem working through and above the casing, a valve adjusting lever connected with the upper end of the stem of said valve, a normally downwardly depressed tappet rod supported for vertical movement at one side of the live steam cylinder under said valve adjusting lever, and having its lower end riding on the periphery of said cam disc, an exhaust steam pipe connecting the upper ends of the two cylinders and provided with an automatic valve, and a valved condenser and air pump pipe connected with the upper end of the large exhaust steam cylinder, substantially as set forth. 4th. In a steam engine, the combination of the upright live and exhaust steam cylinders of different capacities and having lower open ends, the piston heads arranged to work within the cylinders, the horizontal drive shaft supported to rotate below the cylinders and having a cam disc provided with a trip shoulder, the pitman connected to said piston heads and with the drive shaft, a valved live steam pipe connected with the live steam cylinder, an exhaust steam pipe connecting the two cylinders and having a valve casing at the point of connection with the exhaust steam cylinder, a valve plug arranged to work within said casing and having a stem working thereabove, a suitably supported valve lever connected at one end to said valve stem, a normally downwardly depressed tappet rod supported for vertical movement on one side of the exhaust steam cylinder, and connected with said valve lever and having its lower end riding on the periphery of said cam disc, and a valved condenser and air pump pipe connected with the upper end of said exhaust steam cylinder, substantially as set forth. 5th. In a steam engine, the combination of the upright live and exhaust steam cylinders of different capacities and having lower open ends, the vacuum elevated piston heads arranged to work within the cylinders, the piston head for the exhaust steam cylinder being adapted to remain stationary at one point in the operation, a horizontal drive-shaft, the pitman connected to said piston-head, a ratchet disc mounted at an intermediate point on said shaft, swinging pawl arms mounted loosely on the shaft and connected at their swinging ends to the lower end of the pitman for the piston-head of the exhaust steam cylinder, a spring pawl attached to said pawl arms and engaging said ratchet-wheel, a crank connection between the other pitman and the shaft, and the valved live steam and exhaust connections for said cylinders, substantially as set forth. 6th. In a steam engine, the combination of the upright live and exhaust steam cylinders having lower open ends the pistons working within the cylinders, a valved live steam pipe connected with the upper end of the live steam cylinder, a valved exhaust steam pipe connecting the upper ends of both cylinders, a condenser and air pump pipe connected to the upper end of the exhaust steam cylinder, and a vacuum valve arranged to work in the valve opening at the connection of the condenser and air pump pipe with the exhaust steam cylinder and provided at its upper side with a winged stem working through and above the valve opening, said valve being supported in one position against its seat by the piston with the exhaust steam cylinder, substantially as set forth. 7th. In a steam engine, the combination of the upright cylinder having a lower open end, a valved exhaust steam pipe connected with the upper end of said cylinder to feed exhaust steam thereto, the condenser and air pump pipe, also connected with the upper end of said cylinder, and a vacuum valve arranged to work in the valve opening at the connection of the condenser and air pump pipe with the cylinder, said valve being supported in one position against its seat when the piston is at rest within the upper end of the cylinder, substantially as set forth.

No. 49,816. Windmill. (*Moulin à vent.*)



Henry Sutton Hopper, Detroit, Michigan, U.S.A., 29th August
1895; 6 years.

Claim.—1st. In a wind motor the combination of a vane connected by horizontal pivots to a hollow vertical mast adapted to turn with the vane, and a wind-wheel rotating a vertical shaft journaled upon the vane, substantially as described. 2nd. In a wind motor the combination of a vane connected by horizontal pivots to a hollow vertical mast adapted to turn with said vane, a wind-wheel rotating a shaft journaled upon the vane, a vertical power-shaft rotating within the hollow mast, and a universal coupling connecting the wind-wheel shaft with the power-shaft, substantially as described. 3rd. In a wind motor the combination of a vane connected by horizontal pivots to a hollow vertical mast adapted to turn with the vane, a wind-wheel rotating shaft journaled upon said vane, a counterbalance weight adapted to hold the wind-wheel shaft vertical in ordinary winds, and a universal coupling communicating motion to a vertical power-shaft rotating within the hollow mast, substantially as described. 4th. In a wind motor the combination of a vane pivotally connected with a hollow vertical mast adapted to be turned thereby, a wind wheel rotating a shaft journaled upon said vane, a weight suspended from the windward end of the vane, a chain or cable attached to the leeward end of the vane and extending through the hollow mast, and a slot in the lower portion thereof to a sliding collar, a shifter-fork engaging a groove in the sliding collar, and means for drawing it and the sliding downward to incline the wind-wheel and shaft from the vertical, substantially as and for the purpose described. 5th. In a wind motor the combination of a vane pivotally connected to a hollow vertical mast adapted to be turned thereby, a wind-wheel rotating a shaft journaled upon the vane, a ring or link rigidly attached to one end thereof, a vertical power-shaft rotating within the hollow mast, a ring or link rigidly attached to the upper end thereof, and a loose ring engaging the rigid rings upon the said shafts, substantially as and for the purpose described. 6th. In a wind motor the combination of a vane connected by horizontal pivots to a vertical mast adapted to be turned thereby, a wind-wheel rotating a vertical shaft journaled upon the vane, a weight attached to a bracket suspended from the windward end of the vane, a dash-pot attached to said bracket, and a plunger attached to the vertical mast adapted to fit into the dash-pot and form a cushioned stop against which the vane is held in ordinary winds, substantially as described. 7th. In a wind motor the combination of a vane connected by horizontal pivots to a vertical mast adapted to be turned thereby, a counterbalance weight attached to the windward end of the vane, a shaft journaled upon said vane, having wheels attached thereto, and sails located between said wheels and pivotally attached to the periphery thereof, substantially as described.

No. 49,817. Water Boiler. (*Chaudière à eau.*)

Ernest Petersen, Blackfriars Road, England, 29th August, 1895;
years.

Claim.—1st. In water tube boilers wherein two lower water chambers, situated one on each side of the furnace grate are connected to an upper water and steam chamber above the grate by a number of tubes of small diameter, the use of water tubes composed of a group of tubes connected at each end to a closed cup or chamber, the one such chamber being connected by a neck with coned end surface directly to the upper water and steam chamber of the boiler while the other cup or chamber is connected by a neck or connecting tube