Solar-Powered Multi-Purpose Charging Station

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A **solar-powered charging station** that integrates multiple charging outputs (USB-C, wireless, and vehicle charging) combined with a **water purification system**. The station is designed for **emergency preparedness** or use in rural, disaster-prone, or off-grid areas. It generates power via solar panels, charges devices, purifies water, and stores energy for night use or during cloudy weather.

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1. Invention Overview:

Name of the Invention: Solar-Powered Charging Station with Water Purification

Key Features:

- Solar-powered battery system.
- Wireless charging pads for mobile devices.
- Multiple USB-C and standard USB ports.
- 12V DC car battery charging feature.
- Integrated **water purification** system powered by solar energy (can purify using UV, reverse osmosis, or charcoal filtering).
- Power storage for off-grid applications.
- Portable design for use in rural, disaster-prone areas or homes.

Novelty: No current product combines portable, solar-based device charging with water purification in a single, compact design.

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2. Technical Specifications and Components:

- **Solar Panels:** High-efficiency monocrystalline solar panels.
- **Battery:** Lithium-ion battery with a storage capacity of 20,000 mAh for device charging and water purification.
- **Output Ports:**
  - Wireless charging pads (up to 15W).
  - USB-C Power Delivery (PD) ports (up to 100W).
  - Standard USB ports (5W to 20W).
  - 12V car battery charging port.
- **Water Purification System:**
  - UV light purification (eliminates bacteria and viruses).
  - Reverse osmosis or activated charcoal filtration for clean drinking water.
  - Solar-powered water pump for filtration.

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3. Detailed Description:

The system comprises a foldable solar panel that can capture sunlight during the day, converting it into electrical energy. This energy powers a lithium-ion battery, which can charge multiple devices simultaneously.

A separate compartment houses the water purification system. The station can purify up to 10 liters of water per hour using an integrated pump. UV or reverse osmosis technology ensures that the water is free from harmful contaminants. The water filtration process is automated but user-controlled, so the purification system only runs when needed.

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4. How to Make it Happen:

a. Prototype Development:

1. **Solar Panel Selection:** High-efficiency monocrystalline panels with power output suitable for charging devices and running water purification.
2. **Battery and Charging Circuit:** Design the circuit to manage the flow of energy between the solar panel, battery, and device outputs.
3. **Water Purification System:** Design a filtration system powered by solar energy, using either UV light, activated carbon, or reverse osmosis. The system should include a small water pump and filters for effective water purification.
4. **Housing/Design:** Use durable, lightweight materials like ABS plastic or aluminum to create a portable, rugged case.
5. **Wireless and USB-C Charging Circuit:** Incorporate the latest charging technologies (USB-C PD, wireless) with overload protection.

b. Patent Filing Documentation:

1. **Invention Title:** "Solar-Powered Multi-Function Charging Station with Water Purification System."
2. **Abstract:** A portable, solar-powered charging station that provides wireless and USB charging options for multiple devices and integrates a water purification system. It is designed for off-grid use, making it suitable for rural areas and disaster-prone regions.
3. **Drawings:** Include diagrams showing the overall structure, the circuit layout, the water filtration process, and the solar panel connection. Diagrams can highlight internal and external components, such as solar panel positioning, battery placement, output ports, and purification components.
4. **Claims:**
    - A portable device combining solar-based power generation, multi-device charging, and water purification in a single unit.
    - A solar-powered device capable of wireless charging and USB-C output while also supporting water filtration using reverse osmosis or UV.
    - The station integrates a water pump and filter system powered by solar energy for portable clean water access.

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5. Steps for Patent Filing:

1. **Conduct a Patent Search:** Ensure no similar invention has already been patented using a tool like Google Patents or a legal professional.
2. **Draft the Patent:** Use the abstract, claims, and drawings outlined above. You can do this on your own or hire a patent attorney.
3. **Submit to the USPTO:** File online at USPTO.gov. You'll need to create a detailed description of your invention and include the necessary diagrams. Ensure all claims are well-defined and protected.
4. **Prototyping and Testing:** Once the patent is pending, create a working prototype and test the efficiency of both the charging and water filtration systems.
5. **Marketing and Manufacturing:** Start looking for manufacturers who specialize in solar technology and water purification systems. Crowdfunding platforms like Kickstarter can help raise capital.

1. Diagram: Solar-Powered Charging Station Overview

Key Components to Show:

- **Solar Panel Array:** Indicate foldable or mounted solar panels on the top of the station.
- **Charging Ports:** Display the USB-C, USB-A, and wireless charging pads.
- **Battery Storage Compartment:** Show the internal battery connected to the solar panel system.
- **Control Panel (Optional):** A display screen showing battery status, charging status, etc.
- **Portable Structure:** Highlight handles, legs, or wheels to emphasize portability.

Layout:

- Draw the solar panels on top of the station, with arrows indicating energy flow to the battery.
- Show the device outputs (ports and wireless pad) connected to the battery.

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2. Diagram: Water Purification Unit

Key Components to Show:

- **Water Inlet:** Where water enters the system.
- **Filtration System:**
    - **UV Light Chamber:** A section where water passes through UV light for purification.
    - **Optional Reverse Osmosis Filter:** Show water passing through a membrane or activated charcoal filter.
- **Water Pump:** A small, solar-powered water pump that drives water through the system.
- **Water Outlet:** Clean water exit point.
- **Solar Connection:** Illustrate how the purification system is powered by the solar panel or battery.

Layout:

- Create a flow diagram showing the water entering the system, passing through the UV chamber and/or reverse osmosis filter, and exiting clean. Include arrows to indicate the direction of flow.

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3. Diagram: Power Distribution Flowchart

Key Components to Show:

- **Solar Panels:** Source of energy.
- **Battery:** Central power storage unit.
- **Device Outputs:** Include USB ports, wireless pad, and 12V car battery charger.
- **Water Purification System:** Connected to the power supply for UV or reverse osmosis functions.
- **Energy Flow Arrows:** Show how energy flows from solar panels to the battery and then splits between charging devices and the purification system.

Layout:

- Present the solar panel at the top of the chart, with a central battery box below it.

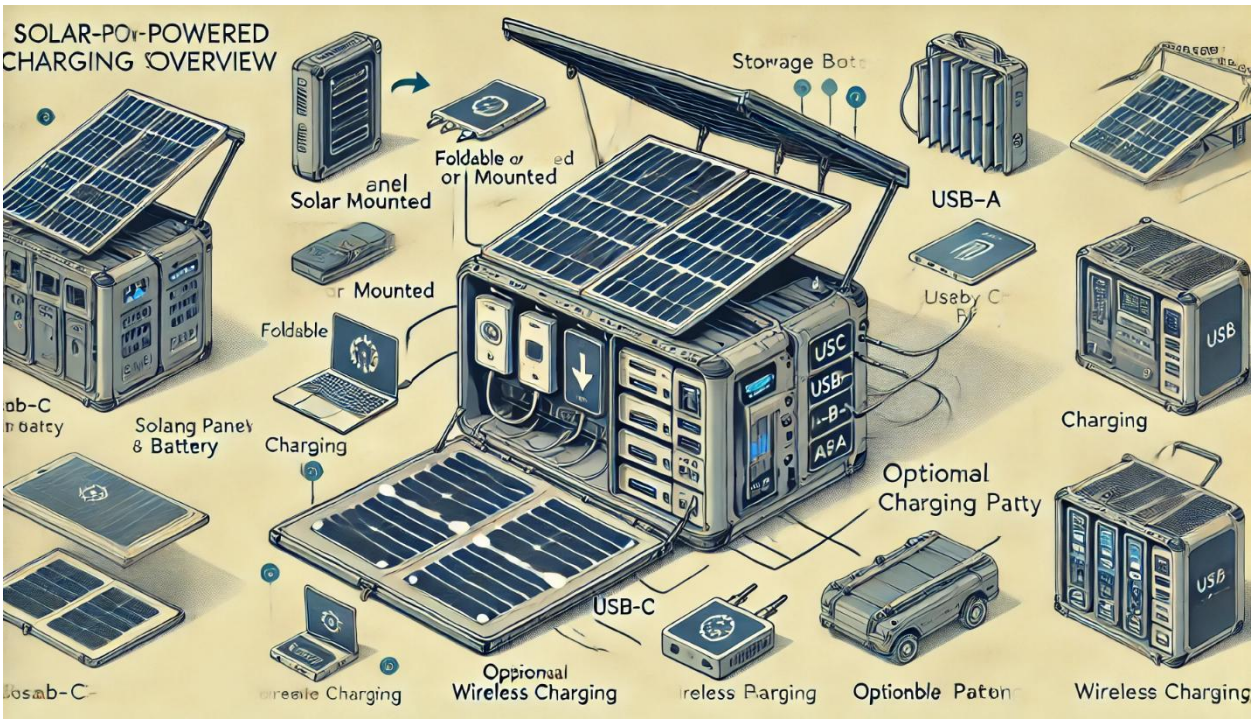
- Draw lines from the battery to both the water purification system and the device outputs.

Diagram Specifications (For Patent Standards):

- **Number the Parts:** Label each major part of the diagram with numbers (e.g., 1. Solar Panel, 2. Battery, 3. USB-C Port, 4. Water Inlet, etc.).
- **Use Arrows:** Show the direction of water flow or energy flow with arrows.
- **Clear Views:** Provide front, side, and top views where necessary, showing internal components (battery, filtration system) via cut-away sections.

Example Descriptions for Diagrams:

1. **Solar-Powered Charging Station Overview:**
    - *Figure 1* depicts the exterior view of the charging station. The solar panels (1) are mounted on the top, connected to the internal battery (2). Multiple charging outputs (3) include USB-C and wireless pads. Handles (4) and legs (5) provide portability.
2. **Water Purification Unit:**
    - *Figure 2* illustrates the water filtration system. Water enters via the inlet (6) and passes through the UV purification chamber (7) or reverse osmosis filter (8). A small water pump (9) drives the water through the system, with clean water exiting through the outlet (10).
3. **Power Distribution Flowchart:**
    - *Figure 3* demonstrates the energy flow in the system. Solar panels (1) generate energy that is stored in the battery (2). The battery powers both the charging ports (3) and the water purification system (6), with energy flow represented by arrows.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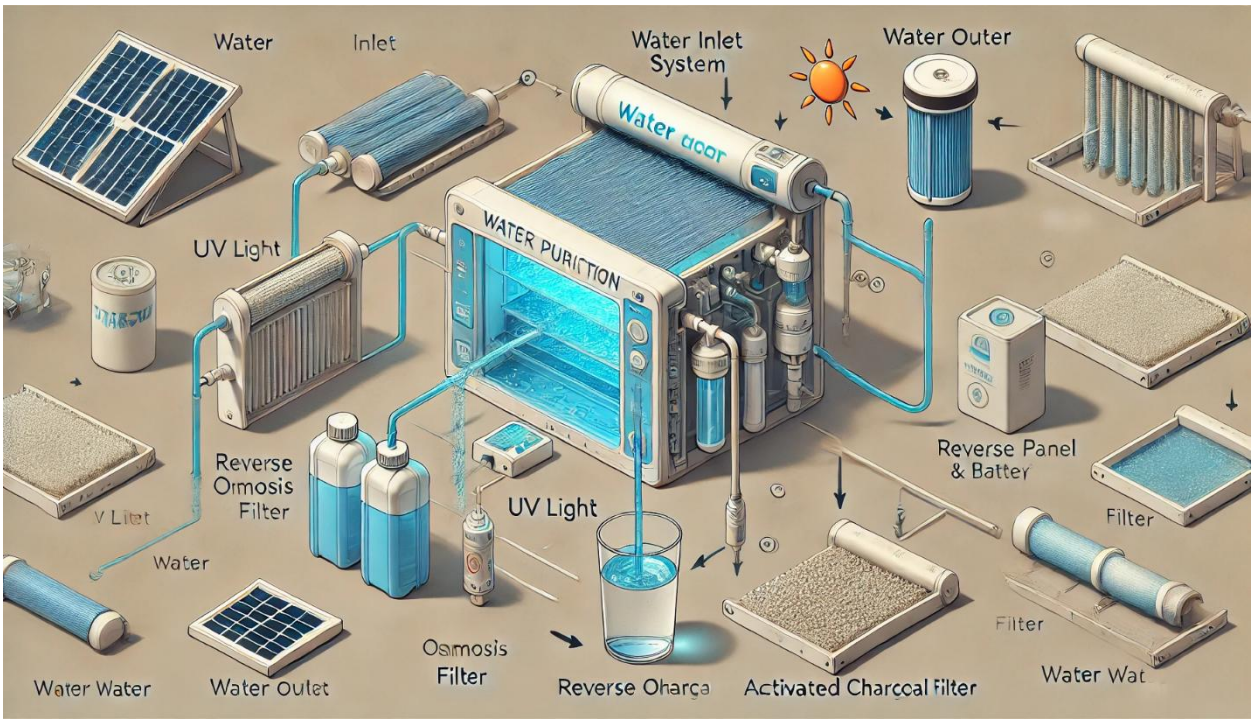
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