US011317264B2

(12) **United States Patent**
MacDonald

(10) **Patent No.: US 11,317,264 B2**
(45) **Date of Patent: Apr. 26, 2022**

(54) **SENSOR AND SYSTEM FOR MONITORING DISPENSER LEVELS, TRAFFIC FLOW, AND STAFF LOCATION**

(71) Applicant: **Mero Technologies Inc.**, Toronto (CA)

(72) Inventor: **James-Andrew Cole MacDonald**, Toronto (CA)

(73) Assignee: **Mero Technologies Inc.**, Toronto (CA)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,945,910 A 8/1999 Gorra
6,553,336 B1 * 4/2003 Johnson G08B 25/08 702/188

(Continued)

FOREIGN PATENT DOCUMENTS

CA 2552123 C 3/2012
CA 2900688 A1 8/2014

(21) Appl. No.: **16/813,005**

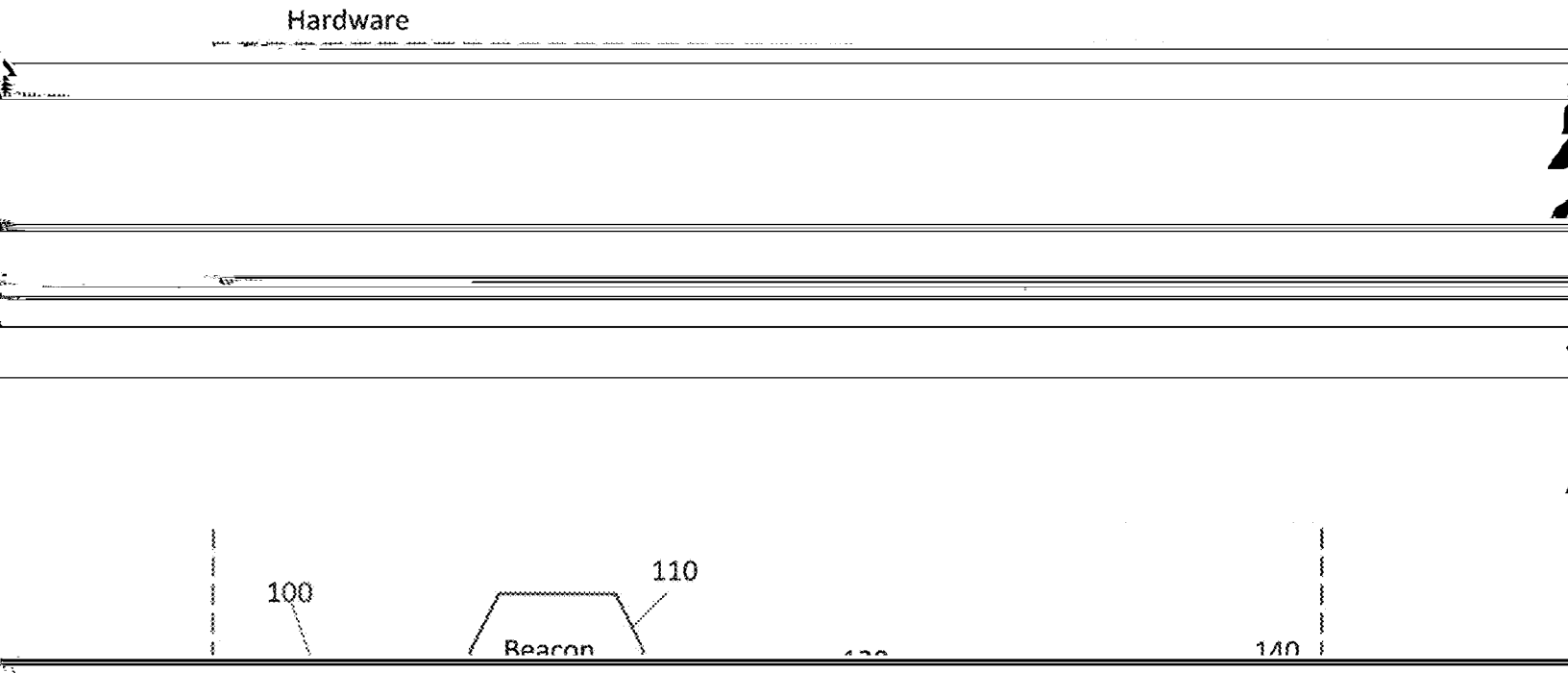
(22) Filed: **Mar. 9, 2020**

(65) **Prior Publication Data**

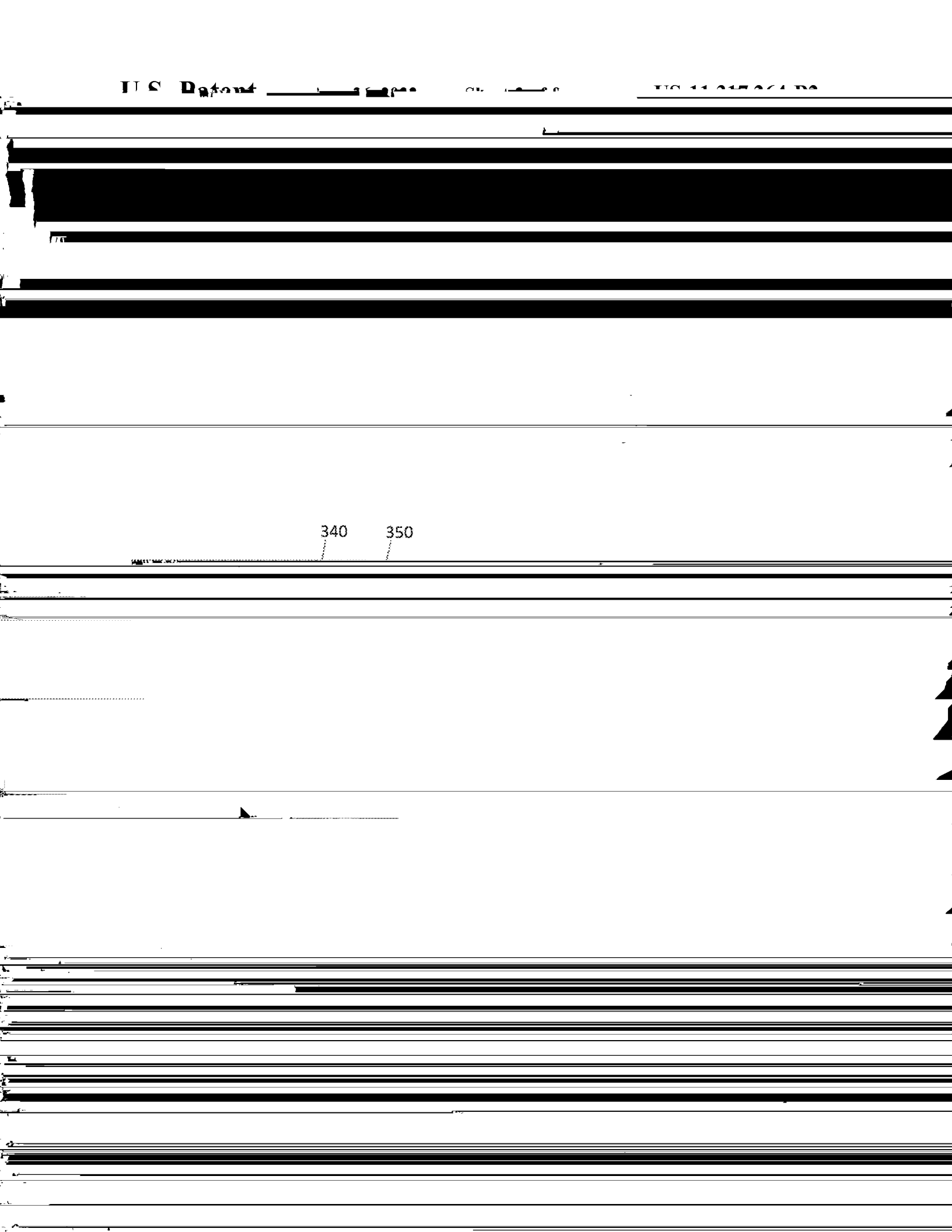
Primary Examiner — Lakeram Jangbahadur
(74) *Attorney, Agent, or Firm* — Stephen J. Scribner

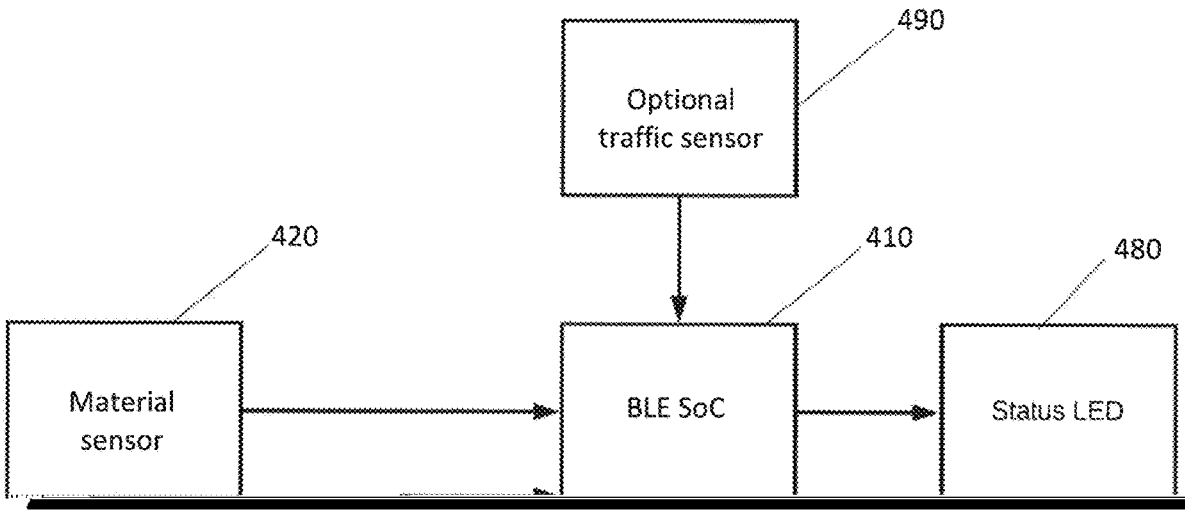
(57) **ABSTRACT**

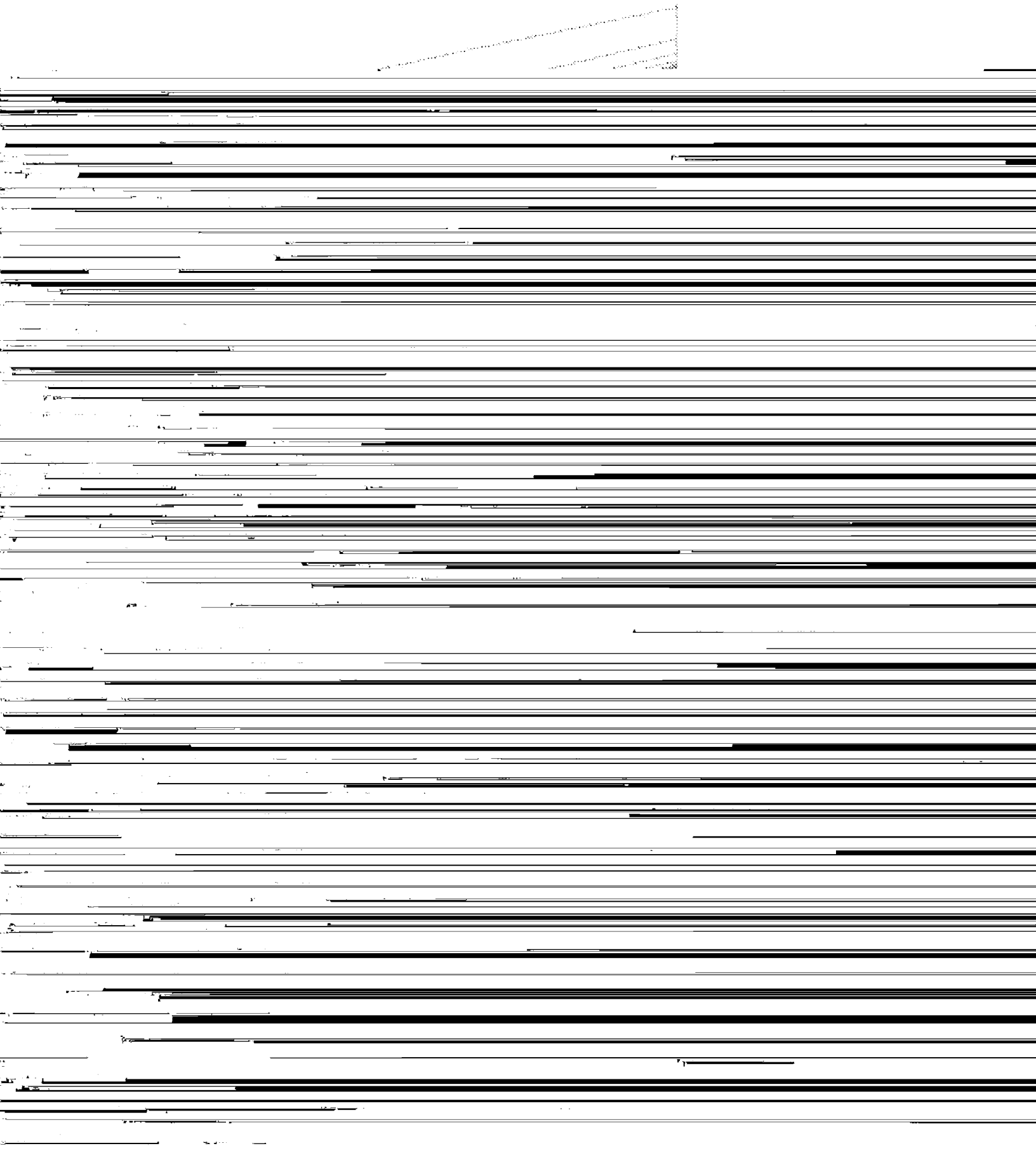
An electronic material sensor for a container, such as a

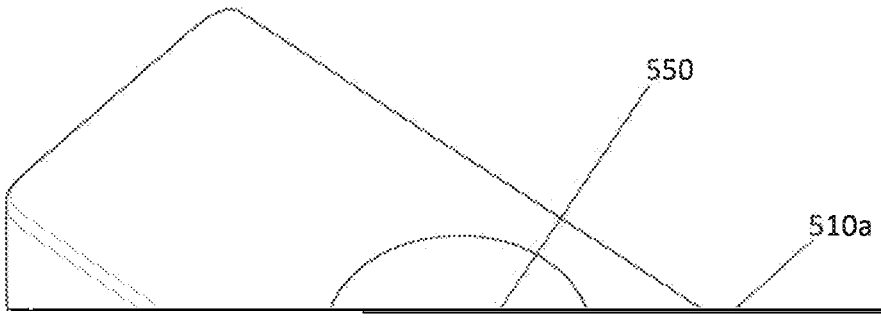

Hardware
100
110
Beacon
140

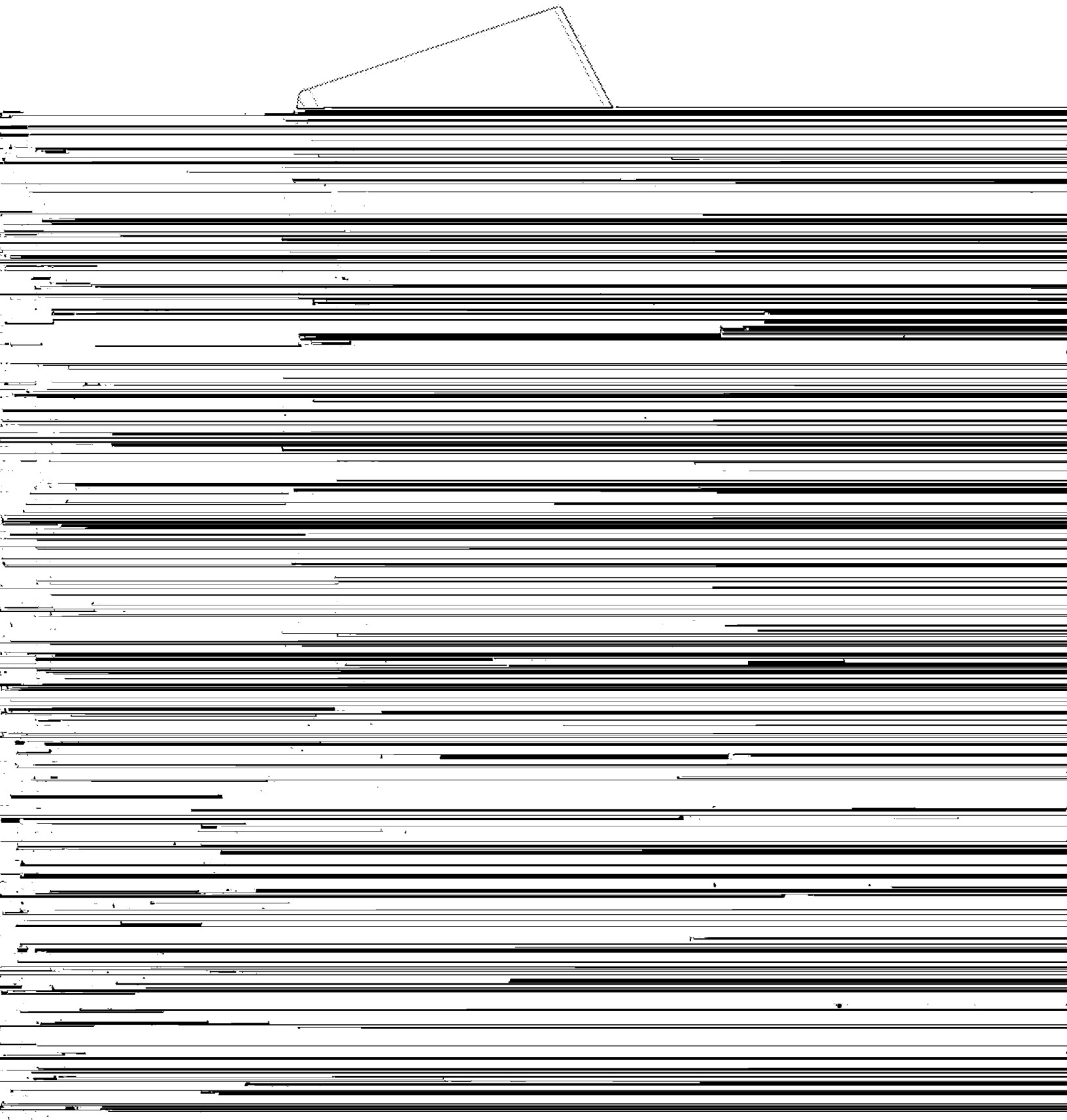

200

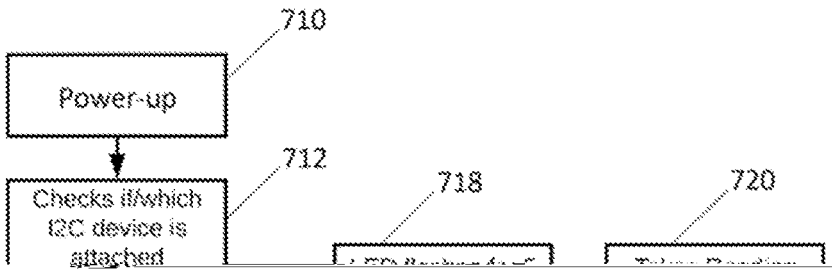

340
350

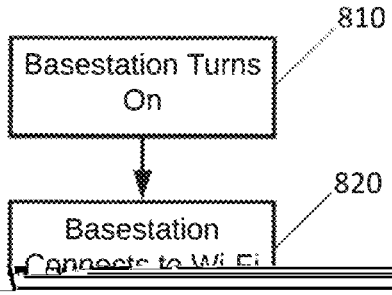

490
Optional traffic sensor
420
410
480
Material sensor
BLE SoC
Status LED




S50
S10a




710
Power-up
712
Checks if/which I2C device is attached
718
720


810
Basestation Turns On
820
Basestation

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

traffic sensors that sense presence of a person in a selected location or within a selected proximity to the traffic sensor; and beacons that may be carried by users so that their

material, e.g., as a retrofit. In some embodiments a material sensor may be specifically designed to fit an existing design or brand of dispenser, and be installed from a factory and/or

trols operation of the system. In some implementations of a

radio checks, etc., all of which are time-consuming and may

paper, feminine hygiene products, etc., of a variety of

"AA" batteries may be used as a power source, although the

example, is shown in FIG. **5**. This embodiment has a housing including a base portion **510***b* and a cover portion **510***a*. A circuit board **520** is mounted on the base portion **510***a* and

cation protocol is initialized at **830**, which may be used to connect to material sensors, traffic sensors, beacons, etc., as described herein at **850**. A connection to a database which

includes circuitry, at least some of which may be similar to

may be a web-based platform such as, e.g., Amazon Web

5. A non-transitory computer-readable medium storing instructions thereon, that when executed by a computer, direct the computer to control operation of a system-comprising:

one or more sensors, at least one sensor comprising a

transmitting data relating to the sensed level of the material to a base station at the selected period of time according to the sleep and wake schedule; and

using a microcontroller to execute a control algorithm that implements the sleep and wake schedule to control operation of the sensing device and the communica-