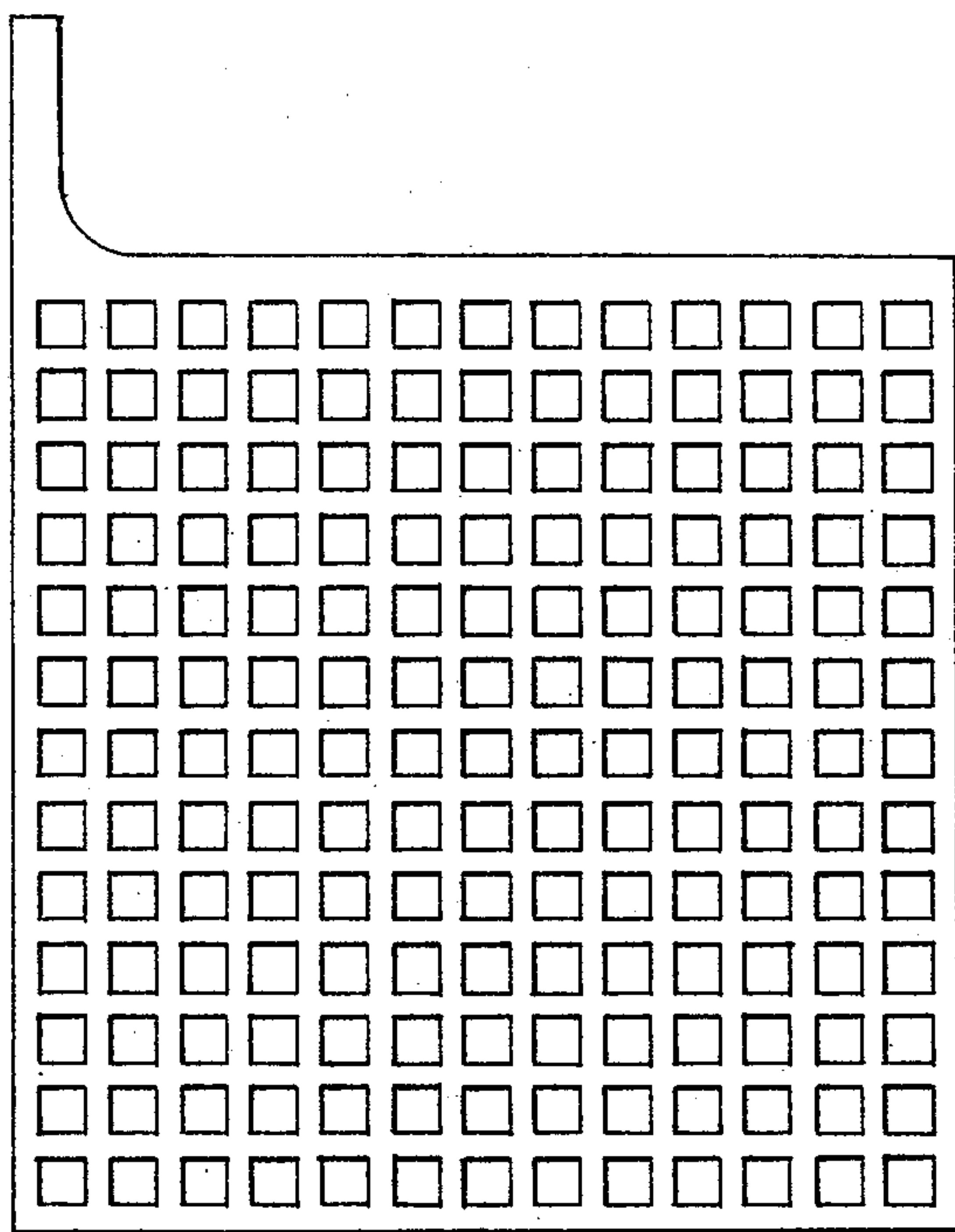


(No Model.)

E. R. KNOWLES.  
SECONDARY BATTERY PLATE.

No. 480,266.

Patented Aug. 9, 1892.



WITNESSES.

*Ch. Buckingham*  
*Wm. Arnone*

INVENTOR.

*Edward R. Knowles.*

# UNITED STATES PATENT OFFICE.

EDWARD R. KNOWLES, OF BROOKLYN, NEW YORK.

## SECONDARY-BATTERY PLATE.

SPECIFICATION forming part of Letters Patent No. 480,266, dated August 9, 1892.

Application filed October 15, 1891. Serial No. 408,820. (No specimens.)

*To all whom it may concern:*

Be it known that I, EDWARD R. KNOWLES, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Alloys for Battery-Plates, of which the following is a specification.

My invention relates to certain new and useful improvements in alloys for battery-plates, such as are described and claimed in an application for Letters Patent filed by me in the United States Patent Office on the 29th day of September, 1888, on which Letters Patent No. 408,182, of the 30th of July, 1889, have since been granted; and it has for its object the rendering of this kind of alloy more fluid and more easily cast in molds, so as to give a cleaner sharper casting. In these Letters Patent I have described an alloy which is oxidizable, stiff, and ductile; but it is found to be difficult to cast into molds and give a clean sharp casting without considerable difficulty and expense. I have discovered that this difficulty can be overcome by the addition to the alloy of a percentage of metallic arsenic,

which will cause the metal to be more fluid when melted and fill the molds better and give a sharp clean casting.

The drawing represents a side view of a storage-battery plate.

I find the following proportions will give satisfactory results, viz: lead, eighty-two per cent., tin, sixteen per cent.; antimony, 1.9 per cent.; and arsenic, 0.1 per cent.

Having thus described my invention, what I desire to claim and patent is—

1. A battery-plate composed of an alloy of lead, tin, antimony, and arsenic, substantially as set forth.

2. A plate for electric batteries, composed of an alloy of about eighty-two parts lead, sixteen parts tin, 1.9 parts antimony, and 0.1 part arsenic.

Signed at New York, in the county of New York and State of New York, this 10th day of May, A. D. 1891.

EDWARD R. KNOWLES.

Witnesses:

E. V. MYERS,  
J. B. SABINE.