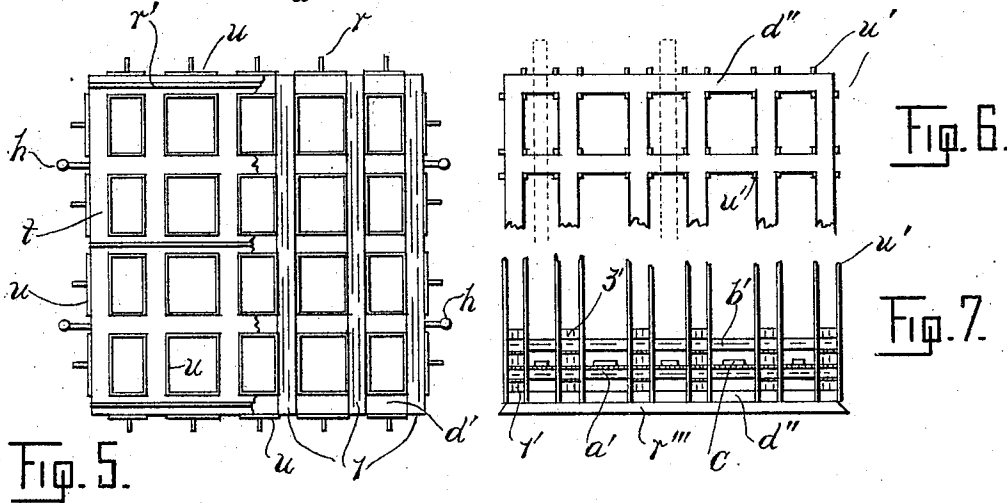
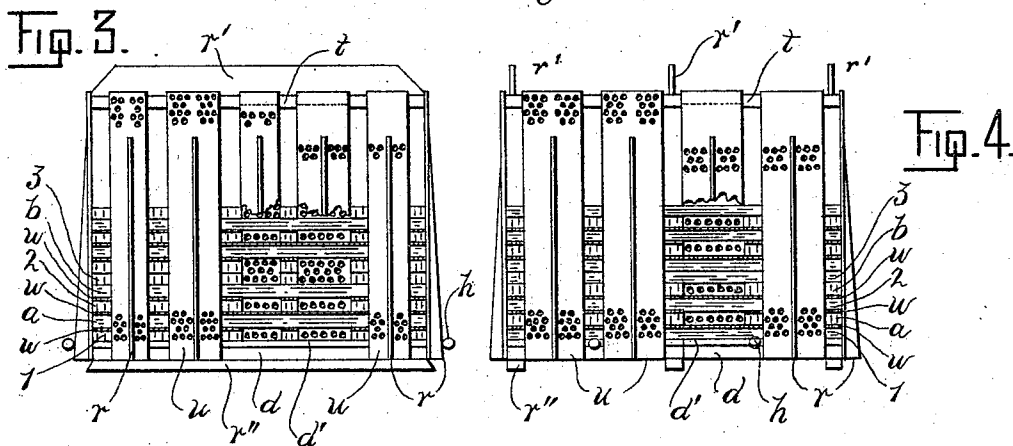
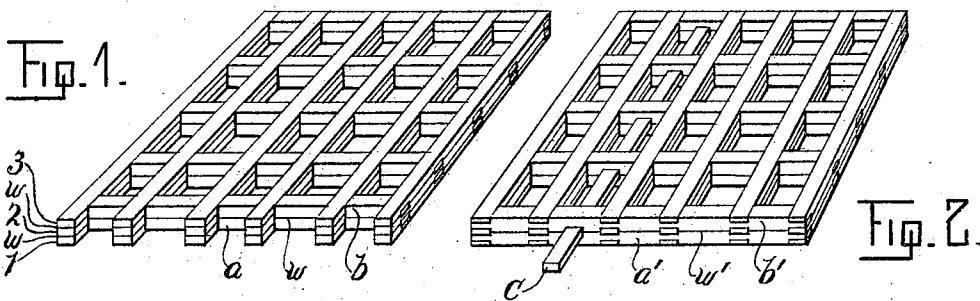


(No Model.)

J. J. ROONEY.
SECONDARY BATTERY SUPPORT OR GRID.

No. 574,826.

Patented Jan. 5, 1897.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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SECONDARY-BATTERY SUPPORT OR GRID.

SPECIFICATION forming part of Letters Patent No. 574,826, dated January 5, 1897.

Application filed February 12, 1896. Serial No. 578,986. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. ROONEY, a citizen of the United States of America, residing at Brooklyn, Kings county, and State of New York, have invented certain new and useful Improvements in Secondary-Battery Supports or Grids, of which the following is a specification.

My object is to construct an inexpensive support or grid for the active material or material to become active which shall be light and non-oxidizable and at the same time possess the properties of porosity, elasticity, and insulation in a higher degree than grids of wood, paper, earthenware, or similar material. With these objects in view I adopt as the material of which the grids shall be made preferably woolen felting, and I produce the grid by laying strips of wool felt in parallel rows lying in two directions at right angles to each other, so that the two sets or rows of strips form rectangular pockets or holes for the active material. I use an odd number of layers of strips laid in one direction and an even number of layers of strips laid in another direction, and make such difference in the thickness of the strips as will bring the two sets of strips on either face flush with each other. These strips are fastened together in any suitable manner, but I prefer to fasten them with any insoluble sealing or cementing composition which is hard when cold, but softens under the influence of heat.

Referring to the accompanying sheet of drawings, which forms a part of this specification, Figures 1 and 2 are perspective views of a grid constructed according to my invention, a metallic conductor being shown in Fig. 2 within one of the rows of holes. Fig. 3 is a side view of the construction-frame used in preparing the grids, the frame being high enough to permit the construction of a number of grids at once. Fig. 4 is a side view of the same construction-frame, looked at from a side of the frame which would be seen at either the right or left hand end of the grids shown in Figs. 1 and 2. Fig. 5 is a top view of the frame shown in Figs. 3 and 4, the top plate being broken away at the right where three strips running up and down the sheet appear. Fig. 6 is a plan view of a modification of the construction-frame of Figs. 3, 4, and 5, the conductors, like *c* of Fig. 2, appearing in the dotted lines. Fig. 7 is a side

view of the modification of the frame shown in Fig. 6, similar in other respects to Fig. 3.

The construction-frame of Figs. 3, 4, and 5 is made up of a base-plate *d*, provided with rows of upright chimneys disposed symmetrically throughout the area of the plate, so as to form intersecting channels between the rows of chimneys. These channels cross each other at right angles and form the guides in which are laid the strips of material to be fastened together. At the end of each row of chimneys along all four sides of the frame are set upright sheets of about the width of that side of the end of the chimney turned toward these sheets. These upright sheets are provided with ribs *r* to stiffen them. The sheets and chimneys are perforated to allow circulation of hot air used. This base-plate *d* is provided with downwardly-extending ribs *r*², forming feet. Upon the base-plate may be set a false bottom *d'*, provided with handles *h*, forming a sort of a tray upon which the grids are built up and by which they can be lifted off from the construction-frame. This tray, of course, is provided with rectangular perforations which fit over the chimneys. It may of course be made up of a few slats, but its use is not important. The frame is provided with three ribs *r'*, upon which pressure can be brought to bear.

Instead of the chimneys above referred to I may substitute mere upright posts, as shown in Figs. 6 and 7. There is a post at each corner of each rectangle of Fig. 6 and posts around the outer edges, one of which lies opposite each of the posts at an outside corner of an outside rectangle of the base-plate. The base-plate is marked in these figures *d*² and the upright posts *u'*. The base-plate *d*² is provided with foot-ribs similar to those marked *r*² in Fig. 3, and in Fig. 7 are shown strips of felting marked 1', 2', 3', *a'*, and *b'*, which are similar to the parts shown in Figs. 1 to 5.

I build up the grid by laying a row of strips, as 1, of wool felt, along each of the channels lying in one direction, then placing upon each of these strips a sealing-wax strip *w*, made up as hereinafter explained, then laying a row of strips, as *a*, through cross-channels with a sealing-wax strip *w*, upon each of these strips, as before. This method of building up is continued by laying strips of wool felt and wax 2 *w* *b* 3 until the desired thickness

is obtained, there being, as is shown in Figs. 1, 2, 3, and 4, an odd number of layers of strips of wool felting in one direction and an even number in the other direction, and the strips in the two directions alternating.

It will be seen by reference to Fig. 1 that for each three strips laid in one direction, which may be called "longitudinal" strips, I use two strips, which may be called "cross-strips," laid across these longitudinal strips. Wax is placed between the intermediate longitudinal strips and the outside longitudinal strips and between the two cross-strips. Having built up one set of layers to form one grid in this way, I may, as shown in Figs. 3 and 4, begin immediately a set of layers to form another grid by duplicating the last set of layers of one grid without putting any sealing-wax between these duplicate layers. Then, treating the second of these duplicate strips as the first row of the new set of strips, I build up the second grid in the manner already explained. Fig. 3 shows strips disposed to form two grids, and it is clear that the frame will hold the layers for a third grid. When the strips have all been properly disposed and the frame is as full as is desired, heat is applied through the chimneys. These chimneys may be sealed at the top and hot air forced in at the bottom. This air will be forced out through the perforations in the side of the chimneys and into the mass of wool felting and sealing-wax, thus melting the wax. The top is brought down onto the pile of strips and pressure is applied, so as to force the strips into close contact. The heat is then withdrawn and the mass held under pressure until the sealing-wax thoroughly hardens, when the pressure is relieved, the top taken off, and the false bottom is lifted out with the grids lying upon it.

I prefer to apply the sealing-wax by taking unsized cotton tape and passing it through a bath of molten sealing-wax. This forms a thoroughly manageable strip of sealing-wax, which can be used to stick the strips of wool felt together. If the sealing-wax be laid on the tape pretty thick, it gives quite a stiffness to the grid, especially if a number of the layers of the wax are used. Instead of putting these strips into the frame by hand I may feed them in from a machine.

As shown in Fig. 1, the ends of the longitudinal layers may extend out in one direction to form foot-rests for the grid, and, as shown in Fig. 2, I may place between some of the layers, preferably the cross-layers, conductors *c*, which are disposed so as to lie along the middle of the holes or pockets formed in the grid. Instead of this method of getting the metallic contact I may wrap metallic strips around the outside of the grid, these strips lying along each layer of perforations, but both the outside and intermediate contact-pieces may be used together. Upon this point reference may be made to my patents dated October 29, 1895, and numbered 549,023

and 549,079; but I prefer the first method above described, because where the conductors are laid between strips so that one conductor shall lie in each row of holes or pockets and midway between the faces of the grid these conductors are never exposed to the solution except through the active material. Therefore in charging there is no shunting of the current or any part of it, but the entire current must traverse the pellets of active material. I make up my plate by filling the pockets or holes with active material or material to become active, and I may so construct the plate that it shall be bipolar or unipolar, as I prefer; but for these details, the methods of securing, contacting, and of holding the active material in place, reference is made to my other United States Patents, Nos. 549,023 and 549,079, of October 29, 1895. I shall not more fully discuss these details here, because the subject-matter of this improvement is the grid or support itself and not the details above referred to.

It is obvious that I may make the grids in large section and then cut them up to suit. It is unnecessary that the work be done by hand, but the point whether the grid is hand-made or done by machinery is not material to my patent.

The grid can of course be made up of strips of wool laid in one direction and of asbestos laid in the other direction or with the strips of wool and asbestos otherwise combined to form the grid, and the strips themselves can be made of mixed wool and asbestos.

Without limiting myself to any particular kind of active material I will state that I may use lead-sulfate.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. A grid for a secondary-battery plate made up of layers of strips of wool felt laid together in sets of rows which cross each other so as to form pockets or holes between the rows, substantially as described.

2. A grid for a secondary-battery plate made up of layers of strips of wool felt, the strips forming the different layers being fastened together by sealing-wax, the strips being laid in sets of rows which cross each other, so as to form pockets or holes between the rows of strips, substantially as described.

3. A grid for a secondary-battery plate made up of layers of strips of insulating and porous material, the strips being disposed in rows which cross each other, forming rows of holes or pockets between the rows of strips and conductors laid between the strips, one along each row of holes or pockets and midway between the faces of the grid, substantially as described.

Signed by me, in New York city, this 11th day of February, 1896.

JOHN J. ROONEY.

Witnesses:

THOMAS EWING, Jr.,
HY. H. WHITMAN.