No. 637,520. Patented Nov. 21, 1899.

E. H. MIDDLETON.

VENTILATOR CAP.

(Application filed June 28, 1899.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

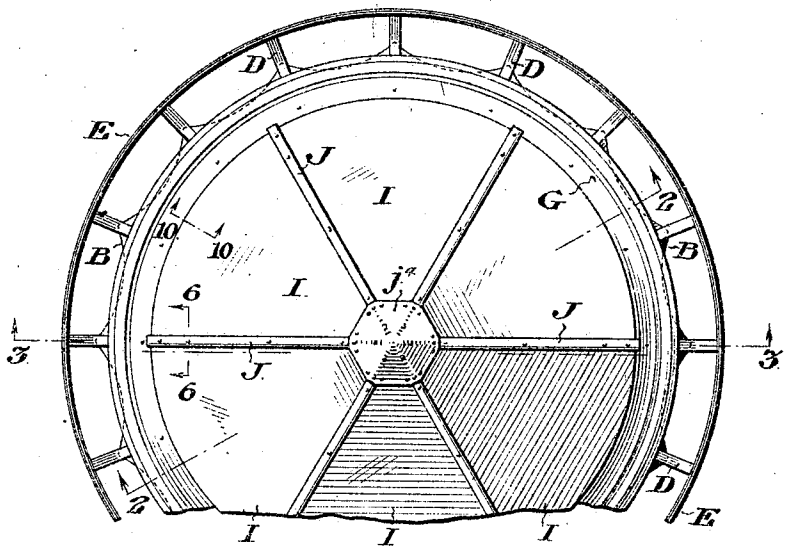


FIG. 2.

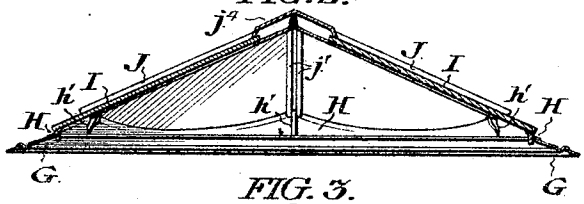
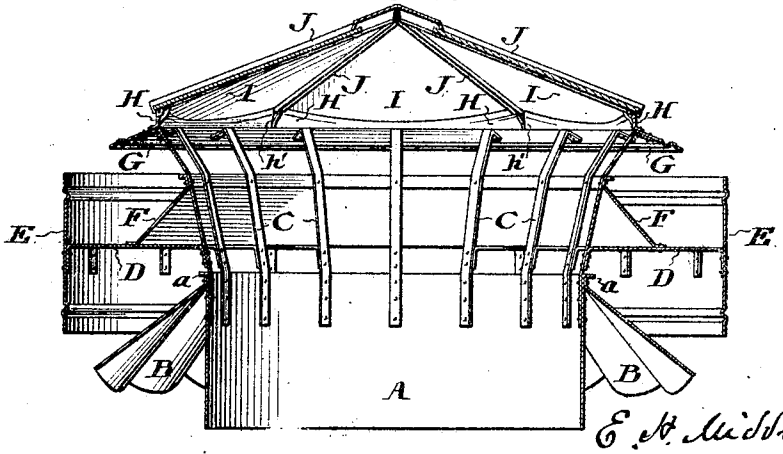


FIG. 3.



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(No Model.) 2 Sheets—Sheet 2.

FIG. 4.

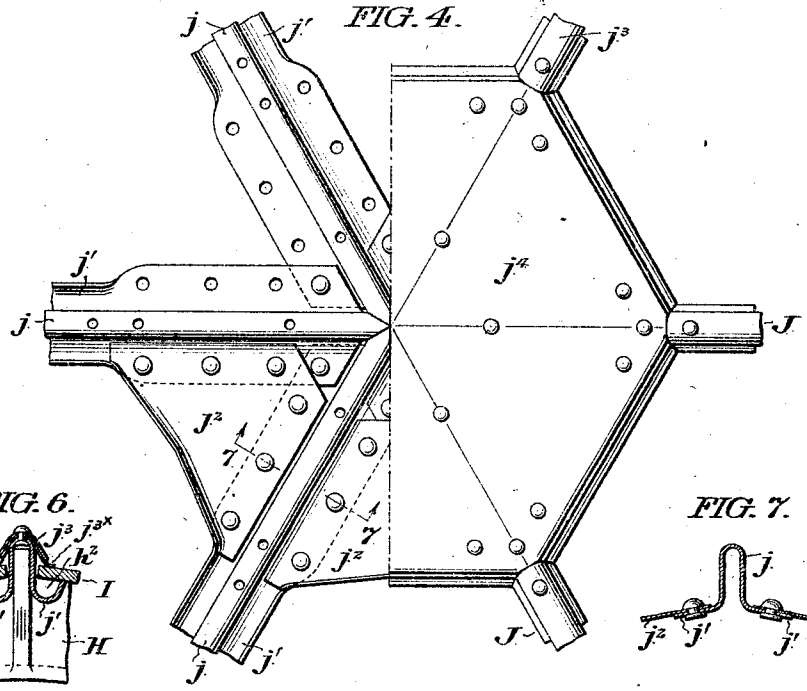


FIG. 6.

FIG. 7.

FIG. 5.

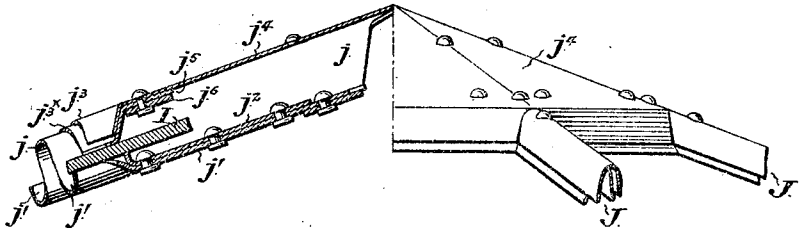


FIG. 8.

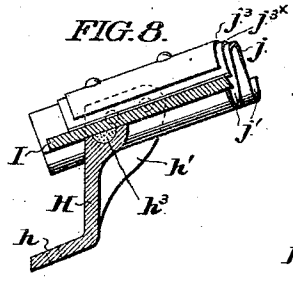


FIG. 9.

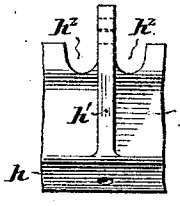
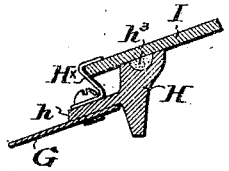


FIG. 10.



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UNITED STATES PATENT OFFICE.

ETHELBERT H. MIDDLETON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE MERCHANT & COMPANY, INCORPORATED, OF SAME PLACE.

VENTILATOR-CAP.

SPECIFICATION forming part of Letters Patent No. 637,520, dated November 21, 1899.

Application filed June 28, 1899. Serial No. 722,127. (No model.)

To all whom it may concern:

Be it known that I, ETHELBERT H. MIDDLETON, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Ventilator-Caps, of which the following is a specification.

My invention relates to devices known as ventilating caps, designed to be located upon or over the upper ends of ventilating flues, shafts, tubes, or outlets, or light wells, and intended, while affording and promoting the freest possible escape of the air, to prevent the entrance of rain or snow or the establishment of back pressure.

It is a desideratum that structures of this class, when employed in certain locations, should be constructed, as to their overarching domes or tops, of glass or other transparent material.

It is one of the objects of my invention to provide ventilating caps, of the larger size, equipped with a skeleton top plate or dome of such character as to be adapted to receive and support a number of relatively small pieces of glass which, when assembled, form, with said frame, a complete transparent top or dome, the structure possessing the further advantage that it may be of conical form, and, therefore, the better adapted to shed water and snow, and accumulated moisture on the inner surface due to condensation.

Owing to the exposed situation of devices of this character, especially when located upon the tops of tall buildings it is especially desirable that they should be of simple construction, and of as little weight as possible,—and at the same time very strong in order to enable them to resist the enormous wind pressures to which they are subjected,—and the difficulty of providing a ventilator cap embodying the characteristics recited, is very much enhanced when the dome or cap plate is formed of a number of sheets of matched glass jointed together in an inclined metallic framework as compared with cap plates formed of single flat sheets of glass.

I have, however, succeeded in providing a dome or cap plate of the character set forth, which combines the features of construction above named as desirable.

In the accompanying drawings,

Figure 1 is a top plan view of a ventilator cap embodying my improvements.

Figure 2 is a vertical sectional elevation of the glass dome and dome-skirt of the same, section being supposed in the plane of the dotted line 2-2 of Figure 1.

Figure 3 is a vertical sectional elevational view of the ventilator shown in Figure 1, section being supposed on the dotted line 3-3 of Figure 1.

Figure 4 is a top plan view of the central portion of the dome, the crown sheet, as I term it, being supposed partially removed to exhibit the construction and arrangement of the parts beneath.

Figure 5 is a view in side elevation, partly in section, of the central portion of the dome, the section being supposed, so far as it extends, on the dotted line 2-2 of Figure 1.

Figure 6 is a fragmentary sectional elevation of certain parts of the dome and its supporting web, section being being supposed on dotted line 6-6 of Figure 1.

Figure 7 is a vertical sectional elevational view of a part of the dome, section being supposed on the dotted line 7-7 of Figure 4.

Figure 8 is a view in side elevation of the parts shown in Figure 6.

Figure 9 is a view in inside face elevation of a portion of the sill of the dome.

Figure 10 is a vertical sectional elevational view of certain parts of the dome and dome skirt, section being supposed on the dotted line 10-10 of Figure 1.

Similar letters of reference indicate corresponding parts.

In the accompanying drawings,

A indicates a vertically disposed cylindrical body formed of sheet metal and constituting the base, so to speak, of my improved ventilator cap, said base being of any such preferred construction and arrangement as to adapt it to be seated in or upon, or supported in operative relationship with respect to, the ventilating shaft or aperture in connection with which the cap as a whole is intended for employment.

Beneath an outwardly flaring lip or flange *a* at the upper end of said base is permanently secured to said base the inner edge of

an annular, radially fluted, downwardly and outwardly extending base skirt B, of any usual and preferred form and dimensions.

C are a series of independent supports, disposed in approximately equi-distant relationship about the circumference of said base, the lower ends of which are secured to the inner face of the base, and the bodies of which extend upwardly and outwardly with respect to the same, as shown particularly in Figure 3.

D are a series of bracket irons, the inner ends of which are riveted or otherwise permanently secured to the structure, conveniently riveted to the uprights C as shown Figure 3,—and the bodies of which are horizontally disposed, as best shown in said figure, and serve to support a band or annulus E which encircles the body of the ventilator cap as a whole. The band E referred to is preferably formed of sheet metal, is of any preferred breadth and radius, and is conveniently attached to the ends of the bracket irons D by rivets passing through its body and through said ends.

F is what I term an intermediate skirt, being an annular inclined or conical plate, preferably formed of sheet metal, disposed above the mouth of the base A with its inner edge in contact with and permanently riveted to the intermediate portions of the supports C, and, as to its lower edge, in contact with and permanently secured to the horizontal intermediate portions of the bracket irons D.

As will be understood, therefore, the uprights, the bracket irons, and the intermediate skirt, are very firmly united and brace each other in such manner that the entire structure is very strong and rigid.

Upon the outwardly turned upper ends of the supports C is mounted, and permanently secured by rivets or otherwise, what I term the dome skirt G, the same being an annular inclined or conical structure or plate of sheet metal conveniently embodying an annular ogee groove as shown particularly in Figures 2 and 3.

H is an annular dome sill, as I term it, of radius corresponding to that of the inner edge of the dome skirt, and preferably formed as a continuous integral structure. Said sill is provided as to its lower edge with a downwardly and outwardly inclined flange h, (see Figures 8, 9, and 10,) of such dimensions as may be found necessary and desirable, which flange is permanently and strongly bolted or riveted to the dome skirt, so that the latter serves to support the sill and superimposed parts.

The upper edge of the dome sill H is provided with a series of upwardly and laterally projecting frame tenons h', disposed at equidistant points about the circumference of the sill, and with a series of pairs of transverse grooves h^2, each pair being formed in connection with, and located one on either side of, one of the frame tenons.

The divisions of the upper edge of the dome sill intermediate of the frame tenons, are each slightly concave from end to end and each embodies a groove h^3 (see Figure 10) adapted to contain any suitable packing material, such as putty, to make a water and surface tight joint between the upper edge of the sill and the sheets of glass, which in the completed structure rest upon the sill.

The metal portion of the dome proper is composed of a multi-armed frame, built up from plates of sheet metal, the arms of which radiate from a central point to the dome sill, to which they are connected and by which they are supported. The angular spaces between the respective pairs of arms are provided or filled with correspondingly conformed plates of glass I, the respective side edges of which latter are secured to the opposing faces of the arms between which the individual sheets are respectively located, and the outer edges of which, as stated, rest upon the upper edge of the dome sill.

The letter J generically designates the radially extending arms of the dome, six of which are present in the construction illustrated.

The dome frame with its arms is constructed as follows: j are a series of main plates, each bent to a U-form in cross-section and provided with two side flanges j', which are upwardly curved from the outer ends of the plates to a point at their inner ends in the vicinity of the center of the dome, and at their said inner ends are flat or approximately horizontal, as shown, especially in Figure 4.

The inner ends of the main plates are beveled and matched as shown in Figure 4 so that they lie or fit very snugly together, with parts of the horizontal portions of the side flanges of each overlying and riveted to the side flanges of the two adjacent plates, whereby said main plates j are very snugly and firmly united.

j^2 are a series of reinforcing plates, (see Figure 4,) of approximately triangular form, disposed respectively within the inner portions of the spaces between adjacent arms, and overlying and firmly riveted to the horizontal portions of the flanges of the main plates. Said reinforcing plates respectively extend from the junction of the arms to the inner ends of the upturned portions of the flanges j' of the main plates j, and the outer edges of said reinforcing plates are upturned to constitute in effect continuations of the upturned portions of the flanges j'.

The outer ends of the main plates j extend over and embrace within their U-shaped recesses the frame tenons h' described, and the upturned flanges j fit snugly within the grooves h^2 at the respective sides of said tenons.

The respective side edges of the triangular plates of glass I, rest upon the upturned flanges j', and the inner ends of said plates I overlie in part the reinforcing plates, resting upon the upturned outer edges of the latter,

The arms are completed by plates j^3 $j^{3\times}$ U-shaped in cross-section which overlie and embrace the U-shaped outer portions of the main plates, and the respective edges of the lower of which make tight and close contact with the upper faces of the glass plates I.

Said overlying plates are preferably formed respectively of iron and lead, the outer plate j^3 of galvanized iron, and the inner one $j^{3\times}$ of lead, and all extend from the outer ends of the arms inward beyond the outer edges of the reinforcing plates, where the sheets j^3 merge into a hexagonal plate, preferably integral therewith, termed herein the crown plate j^4, the dimensions of which render it coterminous with the outer edges of the reinforcing plates, said plate being preferably provided with flanges as illustrated.

The inner sheets of lead $j^{3\times}$, terminate, at their inner ends, in an annular leaden web j^5 which lies against the under face of the crown sheet or plate j^4, and is firmly secured to the body of said crown or cover plate by a series of rivets, as shown in Figures 4 and 5, the leaden web j^5 being braced or reinforced, preferably, by an annular plate j^6 placed against its under face, and against which the inner heads of the securing rivets make direct contact.

The leaden annular web j^5 is provided in the spaces between the arms, with depending flanges which, like the edges of the plates $j^{3\times}$, make water tight contact with the upper faces of the sheets of glass.

The overlying plates j^3 $j^{3\times}$ are secured to the main plates j by rivets or bolts passing through the bodies of all, at desired points, as shown in Figures 4, 5, and 8.

As will be understood, the tenons of the dome sill afford means for very snugly and firmly securing the outer ends of the arms in position, and the entire structure of the dome is not only very light and inexpensive in construction, but is, in its completed form, very thoroughly braced at every point and adapted to resist the stress of wind and the entrance of rain.

As each of the sheets or sections of glass is of plane form, while the annular dome sill is, in plan, preferably of the form of a circle, the upper edge of said sill is, in the respective spaces or regions between the frame tenons, slightly concaved or recessed from end to end of such spaces or regions, to compensate for, the circular form of such spaces or regions, and to afford a perfectly flat resting place for the under faces of the sheets of glass which rest thereon.

Manifestly, if the said dome sill were of uniform height throughout, the flat plates of glass maintained in an inclined position as shown in Figures 2 and 3, would each rest at a single point intermediate of the breadth of its outer edge, upon said supporting web.

Furthermore, as will be understood, the dome is very thoroughly proof against the entrance of rain, or water from melted snow, by reason of the fact that the edges of the plates of glass are embraced tightly and closely between the upturned flanges of the main plates and the downwardly extending edges of an overlying plate of lead, the arrangement being such that even if water should percolate or gain an entrance between the upper face of the glass and the edge of the overlying plate of lead, it will not thereupon descend into the ventilating or light flue, but will drop into the recess or gutter formed by the upturned flange of the main plate by which it will be conducted downwardly and outwardly and discharged upon the dome skirt G which will throw it clear of the ventilator opening.

As will be understood, the structure, as an entirety, is of exceptional strength, rigidity, and lightness, and by reason of the fact that it is built up of matched and fitted plates of sheet metal and that pieces of glass of uniform shape are employed, its parts may be made and assembled with the minimum of skilled labor, the minimum of time, and the minimum of waste of material.

Preferably clips $H^{\times}$ are, as shown in Figure 10, secured to the flange h of the dome sill and by engagement with the outer edges of the sheets of glass secure the latter against any possible tendency to slide downward and outward should they become disengaged from the arms.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In combination, in a ventilator cap structure, a dome frame formed with a series of radial arms each composed of two sheets of rigid metal approximately U-shaped in cross-section, the lower sheet provided with outwardly turned flanges, and the upper sheet provided with an inner facing formed by a leaden sheet placed within it, means for permanently connecting the inner ends of the lower U-shaped sheets, a crown plate overlying the inner ends of said lower U-shaped sheets and permanently connected with the upper U-shaped sheets, substantially as set forth.

2. In combination, in a ventilator cap structure, a dome frame formed with a series of radial arms each composed of two sheets of rigid metal approximately U-shaped in cross-section, the lower sheet provided with outwardly turned flanges, and the upper sheet provided with an inner facing formed by a leaden sheet placed within it, means for permanently connecting the inner ends of the lower U-shaped sheets, a crown plate overlying the inner ends of said lower U-shaped sheets and permanently connected with the upper U-shaped sheets, and a leaden sheet secured to the under surface of the crown plate and provided with a depending flange, substantially as set forth.

3. As an article of manufacture, a ventilator cap structure embodying a vertical dome sill, and a dome or cap plate formed of a series

of radially disposed arms which support approximately triangular plates of transparent material, the ends of which arms are entered in correspondingly shaped recesses in the dome sill and the ends of which plates rest upon the upper edge of said dome sill, substantially as set forth.

4. As an article of manufacture, a multi-armed frame for the dome of the ventilator or light flue cap, consisting of a series of plates of metal U-shaped in cross-section and provided with flanges, and a series of overlying plates U-shaped in cross-section, adapted to embrace the U-shaped portions of the main plate, and to secure between their lower edges, and the flanges of the main plates, the edges of sheets of glass, the inner ends of the main plates converging to a common center, and matched so that their ends are nested together with the flanges of each flanged plate overlapped and secured to the flanges of its neighbor, substantially as set forth.

5. As an article of manufacture, a multi-armed frame for the dome of the ventilator or light flue cap, consisting of a series of main plates of metal U-shaped in cross section and provided with flanges, and a series of overlying plates U-shaped in cross-section, adapted to embrace the U-shaped portions of the main plate, and to secure, between their lower edges and the flanges of the main plates, the edges of sheets of glass, the inner ends of the main plates converging to a common center, and matched so that their ends are nested together with the flanges of each plate overlapped and secured to the flanges of its neighbor, and reinforcing plates mounted between adjacent main plates and riveted to their respective flanges, substantially as set forth.

6. As an article of manufacture, a multi-armed frame for the dome of the ventilator or light flue cap, consisting of a series of plates of metal U-shaped in cross-section and provided with flanges, and a series of overlying plates U-shaped in cross-section, adapted to embrace the U-shaped portions of the main plates, and to secure between their lower edges and the flanges of the main plates, the edges of sheets of glass, a crown sheet or plate to which the inner ends of the overlying plates are connected and which crown sheet or plate covers the meeting inner ends of the main plates, substantially as set forth.

7. As an article of manufacture, a multi-armed frame for the dome of a ventilator or light flue cap, consisting of a series of plates of metal U-shaped in cross-section and provided with flanges, and a series of overlying plates U-shaped in cross-section, adapted to embrace the U-shaped portions of the main plate, and to secure between their lower edges and the flanges of the main plates, the edges of sheets of glass, a crown sheet or plate to which the inner ends of the overlying plates are connected and which crown sheet or plate covers the meeting inner ends of the main plates, and reinforcing plates mounted between adjacent main plates and riveted to their respective flanges, substantially as set forth.

8. In combination with a ventilator cap structure, a dome sill provided with a series of frame tenons, a dome frame formed of a series of radial arms of sheet metal U-shaped in cross-section, the outer ends of which fit over and are supported by the frame tenons, substantially as set forth.

9. In combination with a ventilator cap structure, a dome sill provided with a series of frame tenons, and embodying a series of transverse grooves one at either side of each tenon, a dome frame composed of a series of radial arms of sheet metal U-shaped in cross-section and having upwardly turned flanges, the outer ends of which arms take over the frame tenons, and the upwardly turned flanges of which rest in said transverse grooves or recesses, substantially as set forth.

10. In combination with a ventilator cap structure, a dome sill, a conical skeleton frame consisting of a series of radially disposed arms, the spaces between which are filled by angular sheets of glass, the ends of which arms are connected to the dome sill, and the upper edge of which dome sill, in the regions between the points of attachment of the arms, is suitably shaped or flattened to enable the flat sheets of glass to make tight contact therewith, substantially as set forth.

11. As an article of manufacture, a multi-armed frame for the dome of a ventilator or light flue cap, consisting of a series of radially arranged plates of metal U-shaped in cross-section and provided with upturned flanges, and a series of overlying leaden plates, U-shaped in cross-section, adapted to embrace the U-shaped portions of the main plates and to secure, between their lower edges and the flanges of the main plates, the edges of sheets of glass, and a second series of overlying plates U-shaped in cross-section and formed of rigid sheet metal and arranged to overlie and inclose the leaden plates, reinforcing plates placed between and riveted to the respective main plates at their inner ends and having upturned flanges at their outer edges and a crown sheet or plate having depending flanges arranged over the meeting ends of the main plates, substantially as set forth.

12. As an article of manufacture, a multi-armed frame for the dome of a ventilator or light flue cap, consisting of a series of radially arranged plates of metal U-shaped in cross-section and provided with flanges, and a series of overlying leaden plates U-shaped in cross-section adapted to embrace the U-shaped portions of the main plates and to secure, between their lower edges and the flanges of the main plates, the edges of sheets of glass, and a second series of overlying plates U-shaped in cross-section and formed of rigid sheet metal and arranged to overlie and inclose the leaden plates, reinforcing plates placed between and riveted to the respective

main plates at their inner ends and having upturned flanges at their outer edges, and a crown sheet or plate having depending flanges arranged over the meeting ends of the main plates, said crown sheet or plate being connected with the overlying plates of rigid metal, substantially as set forth.

13. As an article of manufacture, a multi-armed frame for the dome of a ventilating or light flue cap, consisting of a series of radially arranged plates of metal U-shaped in cross-section and provided with flanges, and a series of overlying leaden plates U-shaped in cross-section adapted to embrace the U-shaped portions of the main plates and to secure, between their lower edges and the flanges of the main plates, the edges of sheets of glass, and a second series of overlying plates U-shaped in cross-section and formed of rigid sheet metal and arranged to overlie and inclose the leaden plates, reinforcing plates placed between and riveted to the respective main plates at their inner ends and having upturned flanges at their outer edges, a crown sheet or plate having depending flanges arranged over the meeting ends of the main plates, said crown sheet or plate being connected with the overlying plates of rigid metal and an annulus of lead provided with a depending flange and formed as a continuation of the leaden U-shaped overlying plates, and disposed beneath and secured to said crown sheet, substantially as set forth.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 1st day of June, A. D. 1899.

E. H. MIDDLETON.

In presence of—
F. NORMAN DIXON,
THOS. K. LANCASTER.