

No. 789,306.

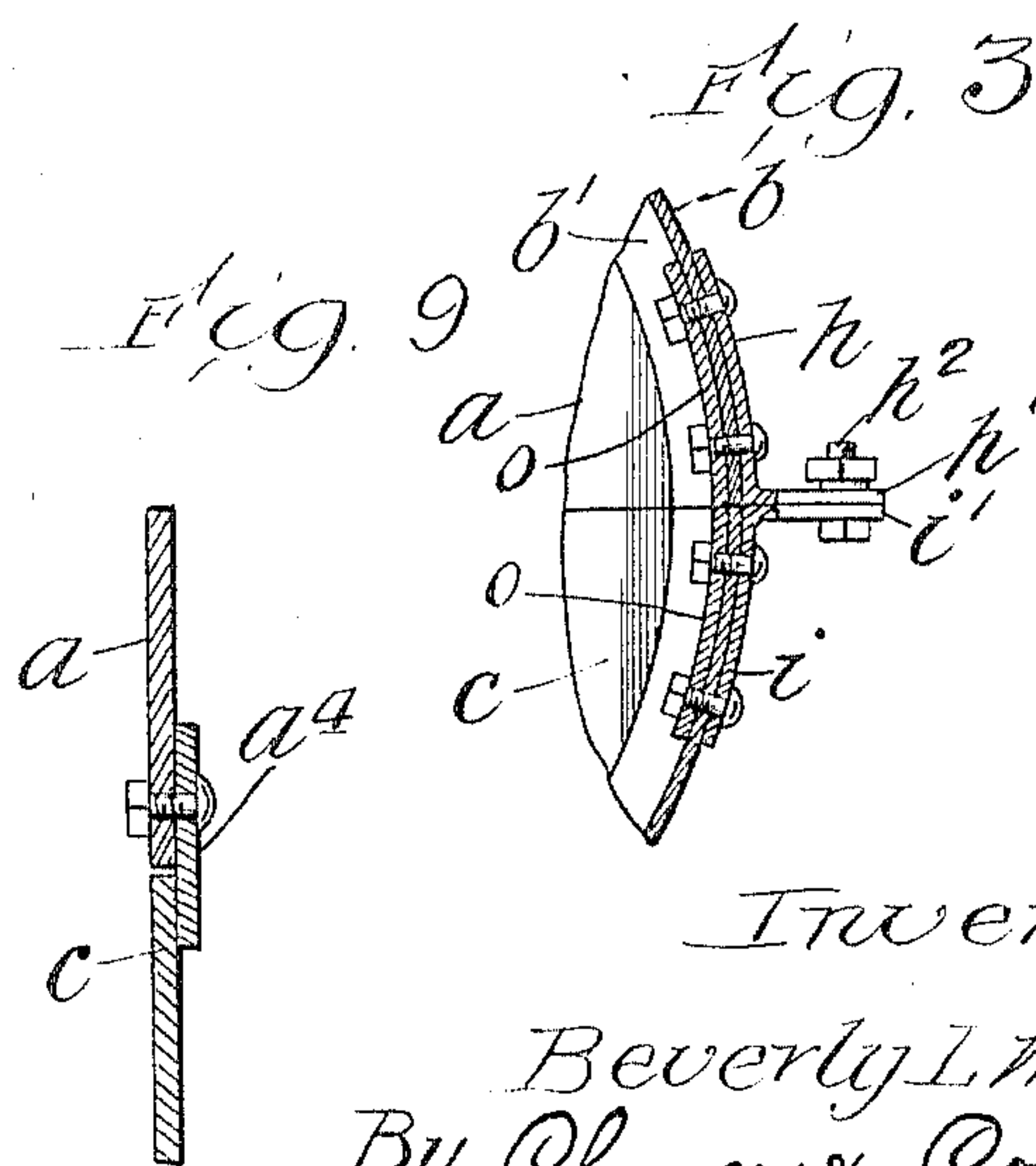
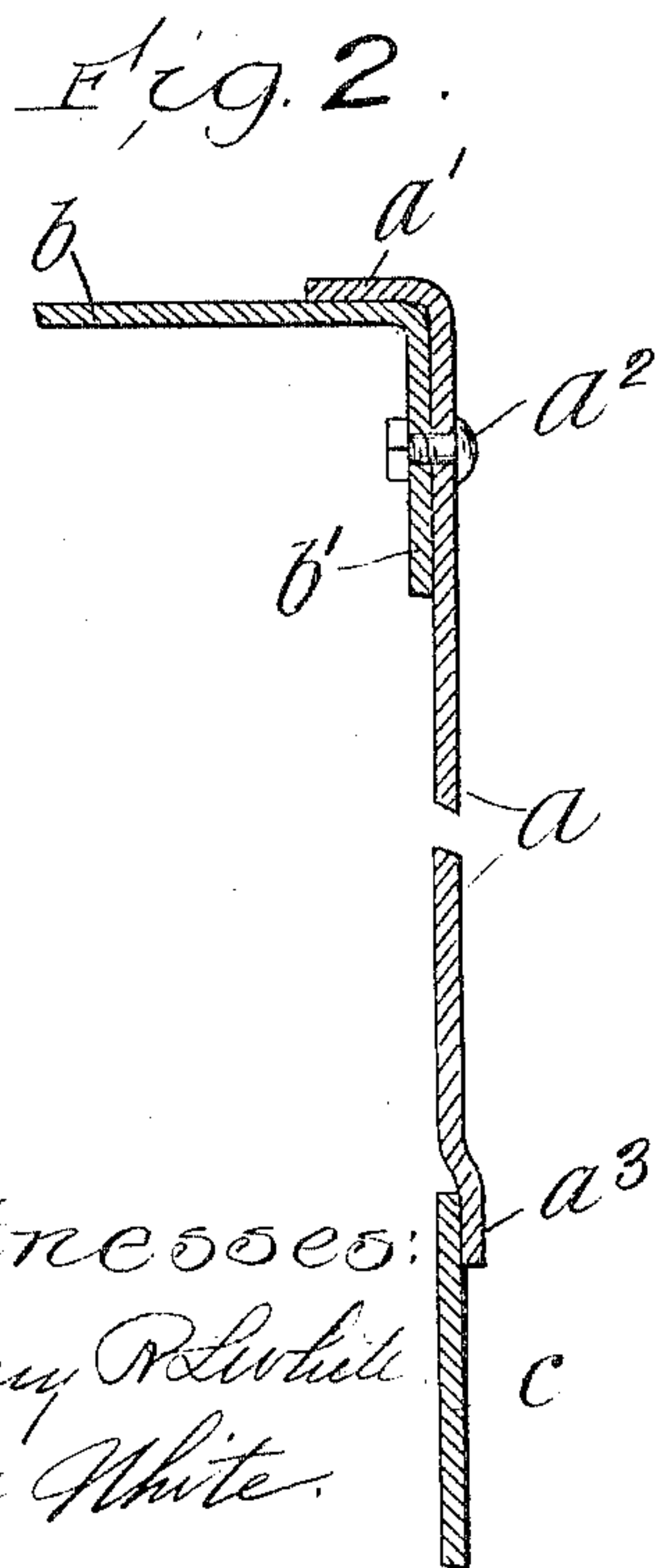
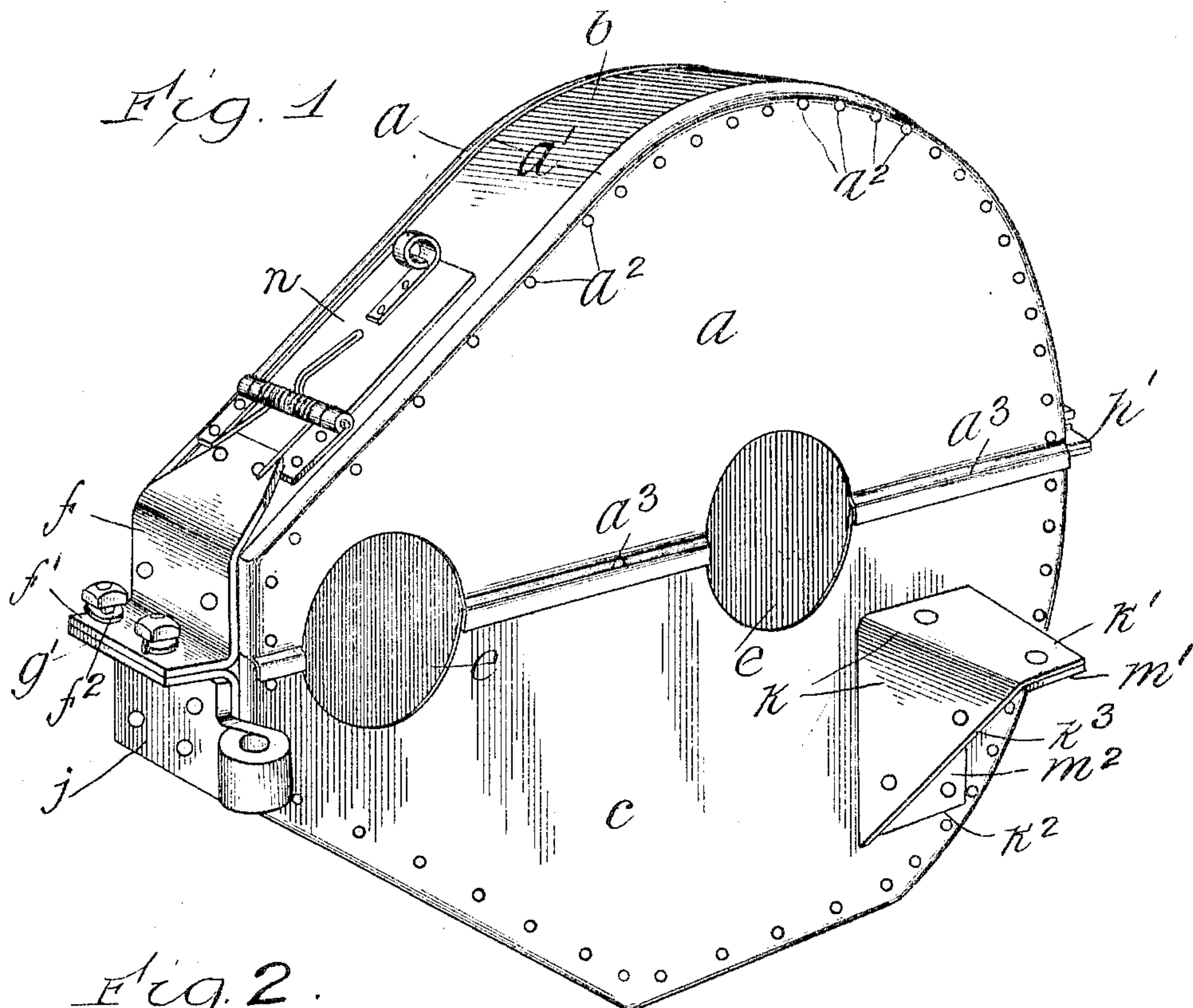
PATENTED MAY 9, 1905.

B. L. WATERS.

GEAR CASE.

APPLICATION FILED DEC. 30, 1904.

2 SHEETS—SHEET 1.



Witnesses:  
Harry R. White  
Ray White.

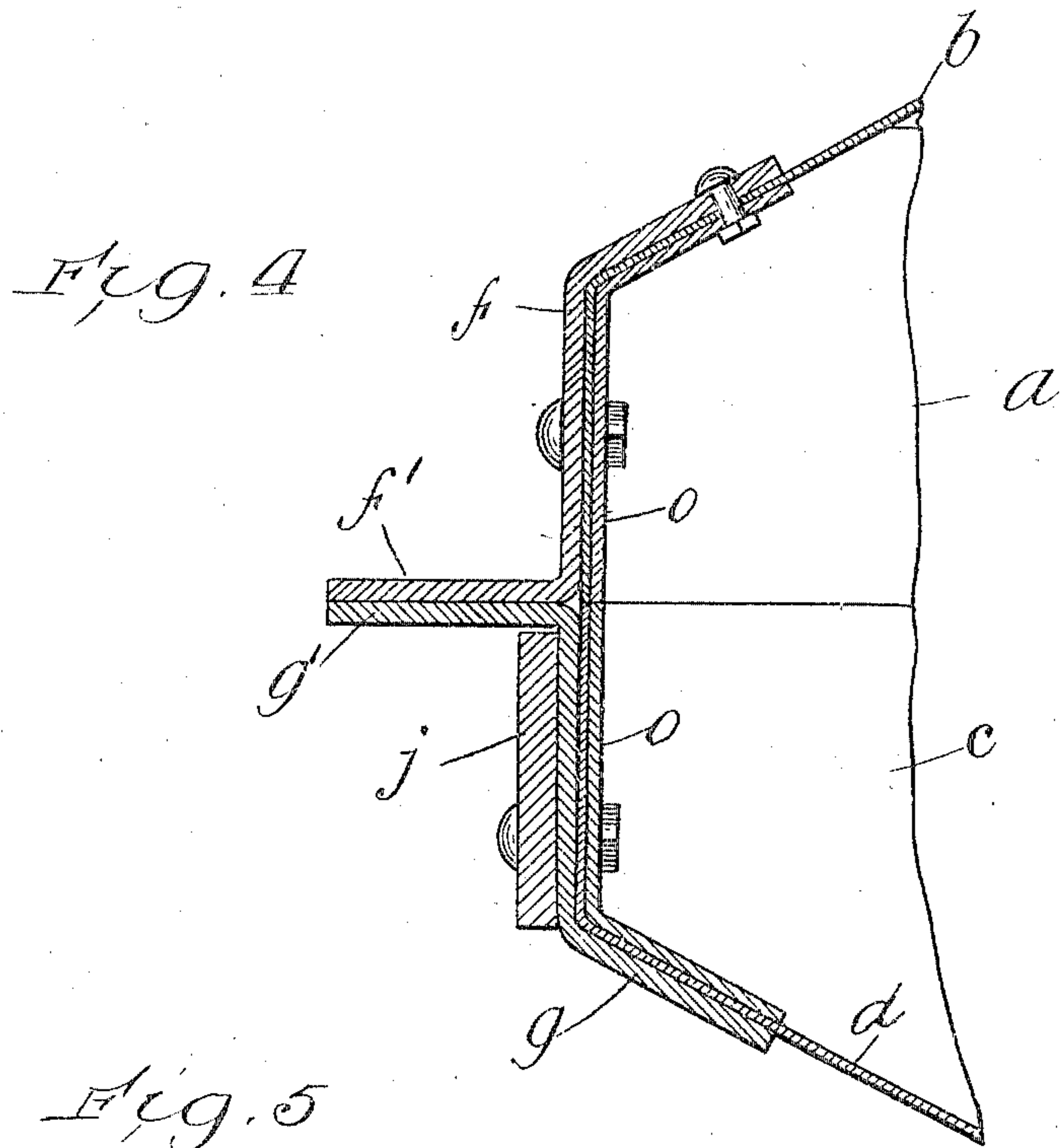
Inventor:  
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By Cheever & Cox  
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GEAR CASE.

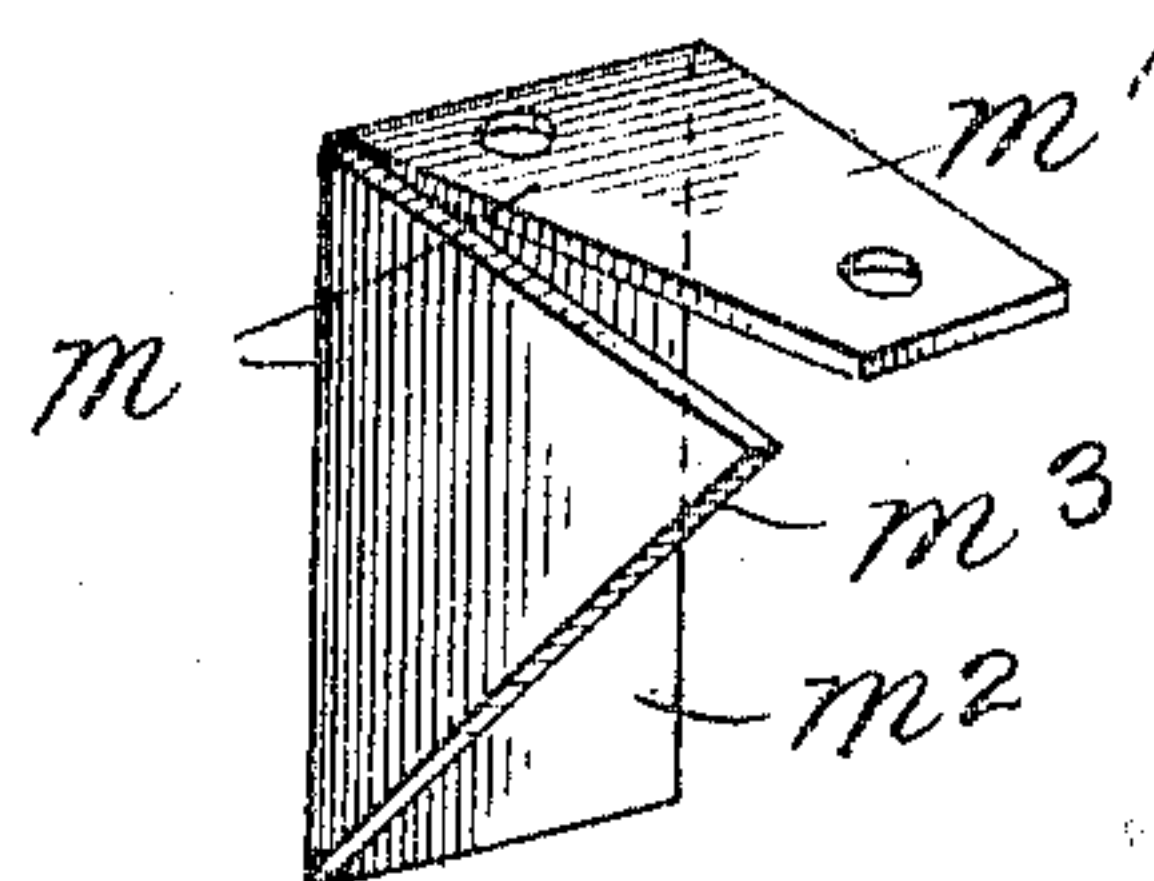
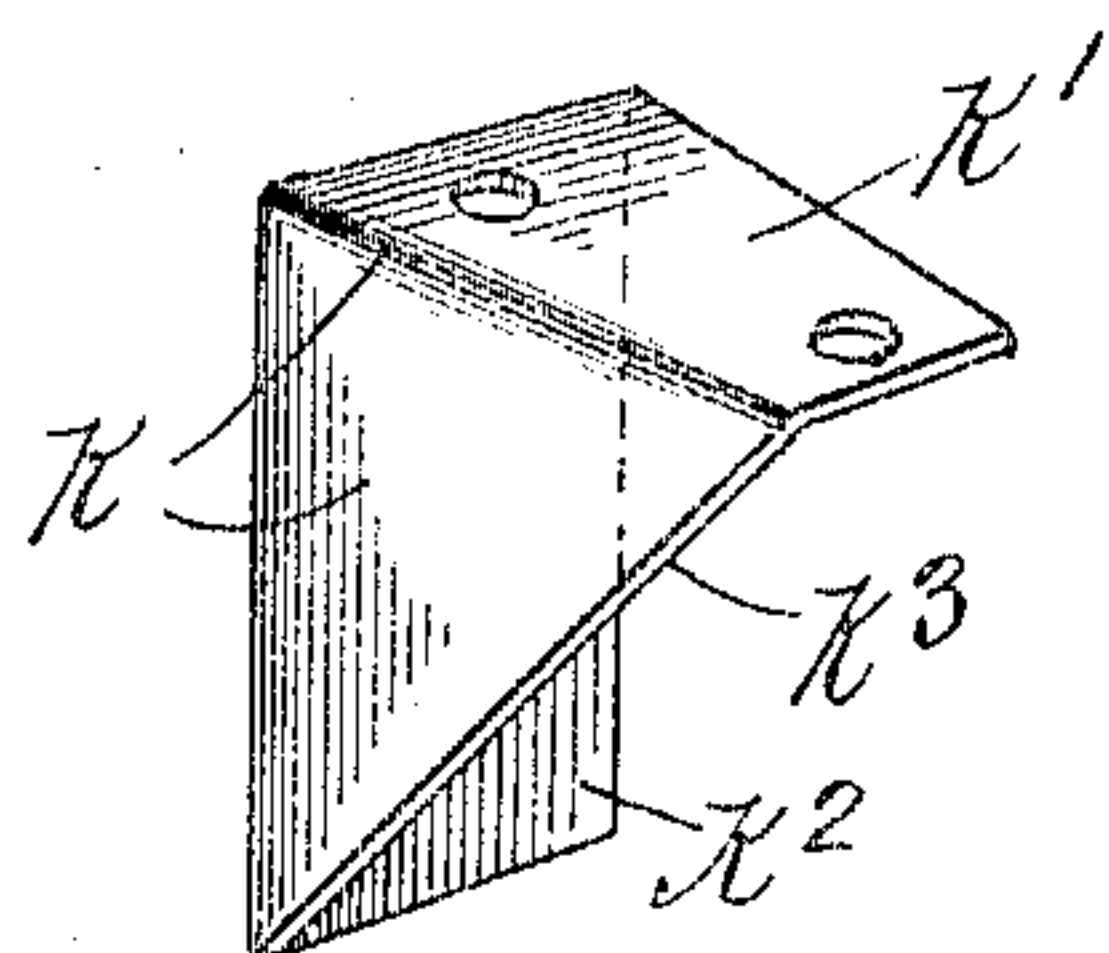
APPLICATION FILED DEC. 30, 1904.

2 SHEETS—SHEET 2.



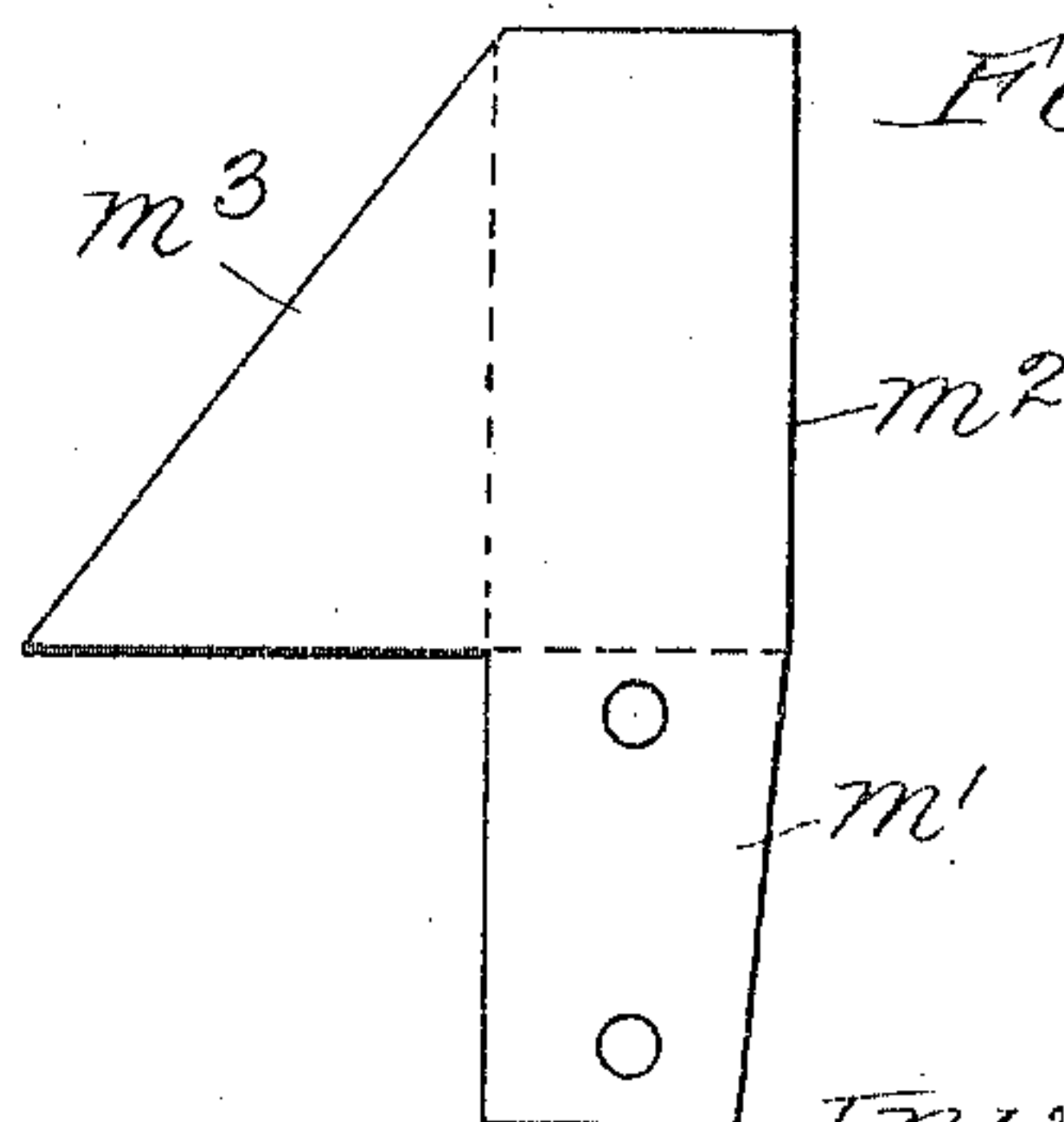
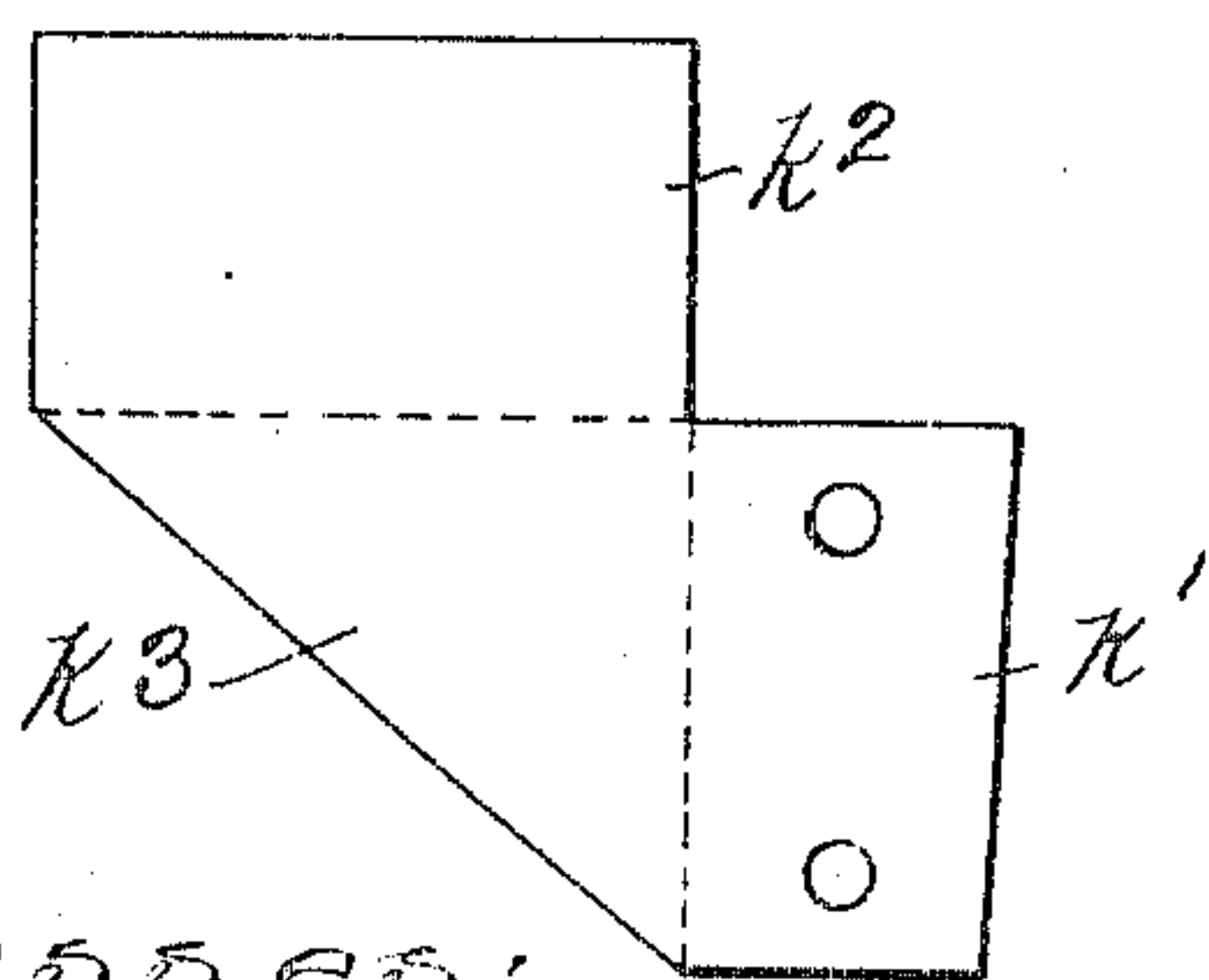
*Fig. 5*

*Fig. 7*



*Fig. 6*

*Fig. 8.*



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## UNITED STATES PATENT OFFICE.

BEVERLY L. WATERS, OF CHICAGO, ILLINOIS.

## GEAR-CASE.

SPECIFICATION forming part of Letters Patent No. 789,306, dated May 9, 1905.

Application filed December 30, 1904. Serial No. 239,030.

*To all whom it may concern:*

Be it known that I, BEVERLY L. WATERS, a citizen of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented a certain new and useful Improvement in Gear-Cases, of which the following is a specification.

My invention relates to gear-cases, more especially those adapted to cover the reduction-gears of street-railway electric motors.

In street-railway work the gear-cases are usually supported directly from the trucks, and consequently have not the benefit of springs for relieving them of shock and jar. The running-gear and gear-cases of railway-cars are, by reason of the jar of the wheels on the track and the constant stopping and starting of the cars, subjected to an extraordinary amount of vibration. As a result common gear-cases are very short-lived and are apt to be a source of annoyance and expense for renewals and repairs.

The object of this invention is to provide a gear-case which shall be light in construction and yet be comparatively indestructible. The chief features by which this object is attained are, first, the constructing of a case in which the top and bottom halves are each composed of three main sheets of sheet metal joined in a peculiar manner; second, the placing of a reinforcing-sheet at the end of the case; third, the forming of a reinforcing and dust-shedding flange at the side joints of the case, and, fourth, the constructing of brackets in a special manner for supporting the case from the trucks of the cars.

I attain my object by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of the complete case. Fig. 2 is a fragmentary view taken transversely to the case and showing the lap construction where the top and bottom join the sides of the case and also showing the reinforcing and alining flange. Fig. 3 is a fragmentary side view of the larger end of the case, showing the end piece and flanges whereby the upper and lower halves are bolted together. Fig. 4 is a fragmentary sectional view taken longitudinally through the

case at the smaller end thereof. Fig. 5 is a perspective view of the outer shell of the supporting-bracket. Fig. 6 illustrates the blank from which the said outer shell is formed. Fig. 7 is a perspective view of the inner shell of the supporting-bracket, showing the same approximately in its finished form. Fig. 8 illustrates the blank from which the inner shell is formed. Fig. 9 is a fragmentary vertical sectional view showing a modified construction of the reinforcing and alining flange.

Similar letters refer to similar parts throughout the several views.

The casing is formed in two halves, which are adapted to part at the centers of the gear-shafts. The upper half of the case consists of the two side sheets *a a* and the top piece *b*, which are all composed of sheet metal and are riveted together in the manner shown in detail in Fig. 2. As shown in said Fig. 2, the top piece *b* has an inside flange *b'*, while the side sheets *a a* lap over the top of said piece *b*, with the flange *a'*. Said side sheets are secured to the flange *b'* of the top piece *b* by means of a row of rivets *a<sup>2</sup>*. The side sheets *c* of the lower half of the case are flanged and secured to the bottom *d* in the same manner. By this lap construction at the corners of the case where the top and bottom pieces join the sides not only is dust positively prevented from filtering through, but the sides form a brace for the top and bottom, and vice versa. The side sheets aforesaid are cut away symmetrically to form the apertures *e e* for receiving the gear-shafts, (not shown,) and the halves of the case are so proportioned as to part along a plane determined by the centers of such shafts.

It is impossible, of course, on account of the presence of gears to have any interior bracing for the side sheets, and in the present case I have circumvented this restriction by forming upon the lower edge of side sheets *a a* a flange *a<sup>3</sup>*, (shown in detail in Fig. 2,) which is offset in such manner as to fit over the upper edge of the lower sheet *c*. This flange forms a stiffener not only for the upper sheet *a*, but when in position upon the lower half of the case also braces the upper edge of the lower side sheet *c*. Said flange *a<sup>3</sup>* has two other ad-



vantages in that it forms a substantially dust-proof joint between the upper and lower half of the case and also facilitates the adjustment of the upper half of the case onto the lower half when for any reason the upper half has been removed.

In order to properly fit over the reduction-gears, one of which is necessarily smaller than the other, one extremity of the case is smaller than the other, with the top and bottom converging, while the larger end of the case is circular in outline and concentric with the nearest one of the apertures *e*. It is well known that a convexly-curved surface is strongest for resisting external pressure, and for this reason the mere form of the larger end of the case is a source of strength. Over the smaller end of the case there is fitted a sheet of metal *f*, which is extended part way up along the top piece *b* in the manner best shown in Figs. 1, 3, and 4. This end piece *f* is constructed of a single sheet of metal, and from the same piece is formed a projecting flange *f'* in such manner that it may be bolted to a corresponding horizontal flange *g'* on the end piece *g* on the lower half of the case. The flanges *f'* and *g'* are correspondingly apertured to receive bolts *f''*, whereby the upper half of the case may be removably attached to the lower half. At the opposite end of the case are placed the upper and lower end pieces *h* and *i*, respectively, which have formed thereon the substantially horizontal flanges *h'* and *i'*, respectively, correspondingly apertured to receive the bolts *h''*, as shown in Fig. 3.

The end pieces *f*, *g*, *h*, and *i* are all securely riveted to their respective parts of the case, and by preference reinforcing-sheets *o* are fitted inside the case at the parts thereof corresponding to said end pieces *f*, *g*, *h*, and *i*. Part of the smaller end of the case is vertical, while the adjacent portion of the top and bottom pieces are oblique thereto, and the end pieces *f* and *g* are so constructed as to cover not only the vertical end parts of the case, but a part also of the oblique portion thereof, the result being that the corners or bends formed between the vertical and the oblique parts of the case are protected by a single sheet of metal, as best illustrated in section in Fig. 4. A lug or bracket *j* is securely riveted at the smaller end of the case to the end piece *g* for the purpose of rigidly supporting the smaller end of said case.

The side bracket, which is of special construction, consists of two shells formed of single pieces of sheet metal, as illustrated in Figs. 5 to 8, inclusive. The outer shell *k* is composed of three leaves, the upper leaf *k'* being designed to lie substantially horizontal, leaf *k''* being designed to stand substantially vertical and be attached directly to the side sheet *c*, and the leaf *k'''* being designed to connect the other two parts and form a verti-

cal web, as best shown in Figs. 1 and 5. With this construction when the outer shell is bent into form as shown in Fig. 5 there will be only one cut therein, which will occur where the inner edge of leaf *k'* approaches the upper edge of leaf *k''*. The inner bracket-shell *m* consists of three leaves *m'*, *m''*, and *m'''*, the leaf *m''* being designed to be secured against the leaf *k''* aforesaid and the leaves *m'* and *m'''* being designed to contact the leaves *k'* and *k''*, respectively. When the inner shell *m* is formed up as indicated in Fig. 7, there will be only one cut therein, and this will occur at the upper edge of leaf *m'''*. Now it is to be noted that the cut in the inner shell *m* will be adjacent to a bend in the outer shell *k*, while the cut in said outer shell will be adjacent to a bend on the inner shell, with the result that there will be no point on the complete composite bracket where two cuts will come together. The inner and outer shells *k* and *m* are riveted together in the finished bracket, and the leaves *k''* and *m''* thereof are securely riveted to the side sheet *c*. This produces a remarkably strong and light bracket, which will resist an almost unlimited amount of vibration. In addition to forming a support for the case the bracket when bolted to the proper part of the trucks produces the additional effect of stiffening and bracing the sides of the case. This is all the more important because the case is supported from one side only, a single side bracket being employed in addition to the bracket *j* at the end. The reason for employing a single side bracket is that the arrangement of the motor and car trucks is usually such as to prevent the supporting of the gear-cases from both sides. In the present instance the leaves *k'* and *m'* are correspondingly apertured to receive bolts for attaching the case to the trucks; but it is obvious that the attachment might be made through the vertical parts *k'''* and *m'''*, if desired.

In order to afford ready access to the gears for oiling the same without the necessity of removing the upper half of the gear-case, a hinged oil-door *n* should be provided at a convenient point in the top piece *b*.

Although I prefer to construct the flange *a'''* of a single piece with the side sheets *a a*, it is possible to obtain an analogous effect by the construction shown in Fig. 9, in which a separate overlapping strip *a''* is riveted to the lower edge of said upper sheet *a*.

What I claim as new, and desire to secure by Letters Patent, is—

1. A gear-case formed in two halves, the sides being parallel and the top and bottom pieces being disposed at right angles thereto and composed of sheet metal riveted together, one end of said case being circular in outline and the other end being smaller, with the top and bottom pieces converging and the end surface being substantially vertical; in combination



with reinforcing end pieces *f* and *g* horizontally flanged for bolting the halves together, said piece *f* extending over the entire end surface of the upper half and over a portion 5 of the top surface to thereby protect the bend or corner in said top piece.

2. A gear-case formed in two halves and having parallel sheet-metal sides; in combination with a single supporting-bracket rigidly attached to one side of the lower half of said case, whereby the weight of the case tends to cause the bulging of the supported side, the upper half of the case having a flange adapted to engage the outsides of the upper edges of 15 the lower half to thereby prevent the bulging of the sides of said lower half.

3. A gear-case formed in two halves and having parallel sheet-metal sides; in combination with a bracket rigidly attached to one half of 20 the case for supporting the same, said bracket having broad flat surfaces adjacent to the side of the case for stiffening and bracing the same.

4. A gear-case formed in two halves and hav-

ing parallel sheet-metal sides; in combination with a bracket rigidly attached to one half of 25 the case for supporting the same, said bracket being composite and formed of two interfitting shells breaking joints with each other for the purpose described.

5. A gear-case formed in two halves and hav- 30 ing parallel sheet-metal sides; in combination with a supporting-bracket rigidly attached to one side, said bracket consisting of two interfitting shells formed from single sheets of metal each shell having a top, a back and a 35 vertical rib or web, and the parts being bent up to bring a cut in one shell adjacent to a bend in the other for breaking joints.

In witness whereof I have hereunto subscribed my name in the presence of two wit- 40 nesses.

BEVERLY L. WATERS.

Witnesses:

HOWARD M. COX,  
CAROLYN RAFTERY.