

No. 837,707.

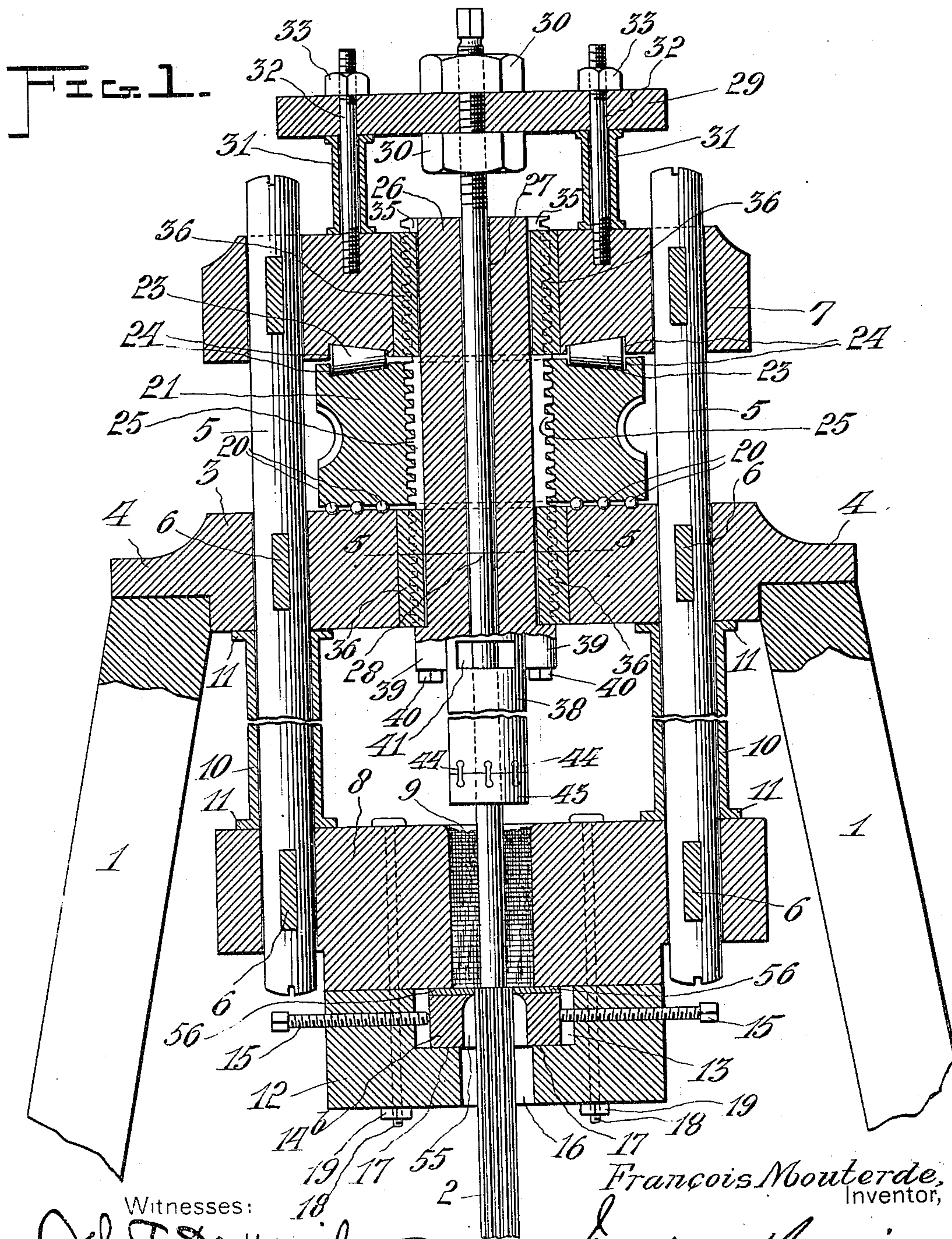
PATENTED DEC. 4, 1906.

F. MOUTERDE.

# APPARATUS FOR FORMING TUBES FOR ELECTRODE PLATES.

APPLICATION FILED JULY 31, 1905.

3 SHEETS—SHEET 1.



Witnesses:

Witnesses: 18  
John F. Defferville  
F. H. Gibbs

By

*François Mousterde,*  
Inventor,

Marion & Marion

Attorneys



No. 837,707.

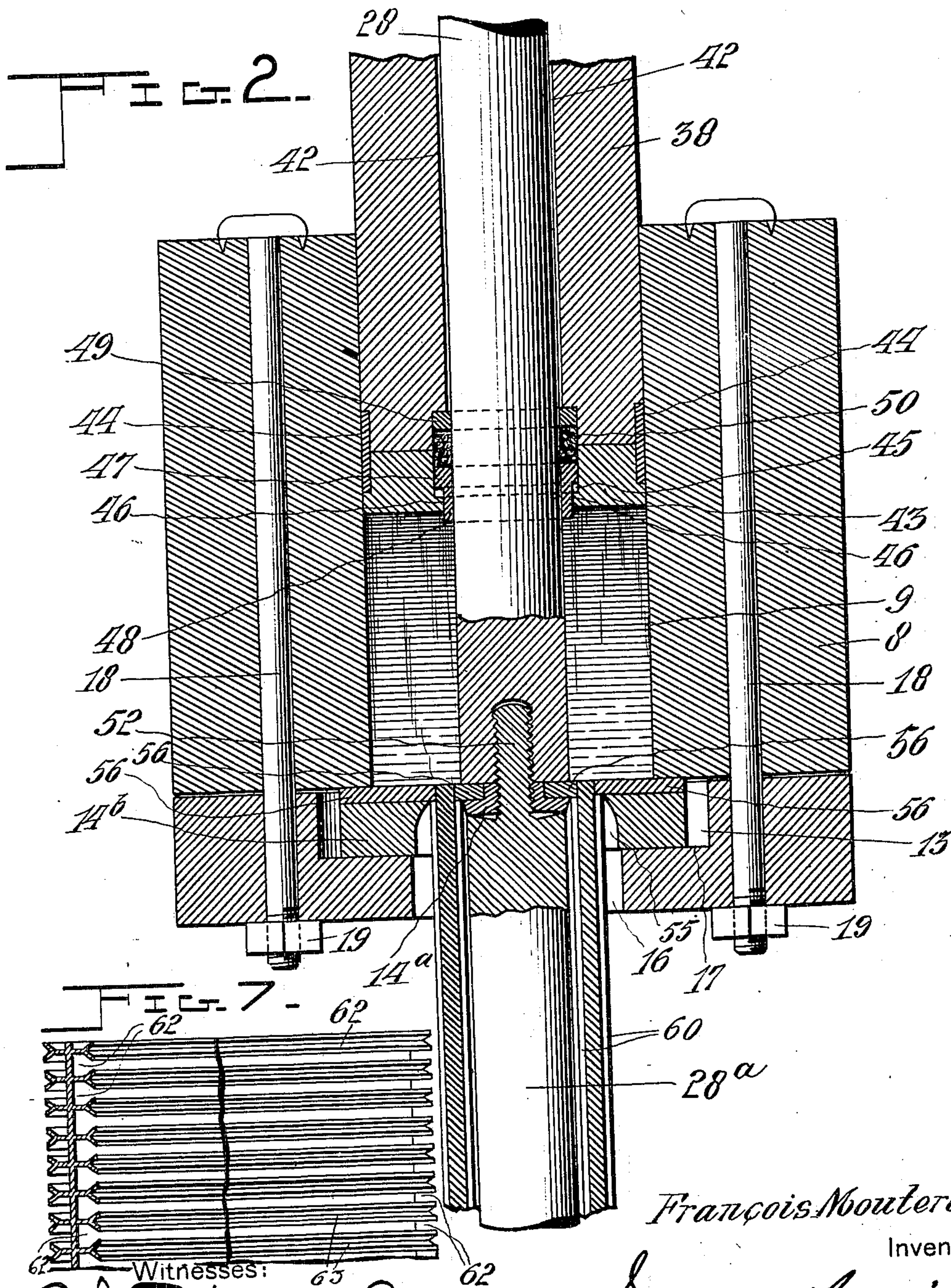
PATENTED DEC. 4, 1906.

F. MOUTERDE.

APPARATUS FOR FORMING TUBES FOR ELECTRODE PLATES.

APPLICATION FILED JULY 31, 1905.

3 SHEETS—SHEET 2.



Francois Mouterde,

Inventor,

By *Marion & Marion*

Attorneys

Witnesses:  
*John F. Deufferwald*  
*J. H. Gibbs*



No. 837,707.

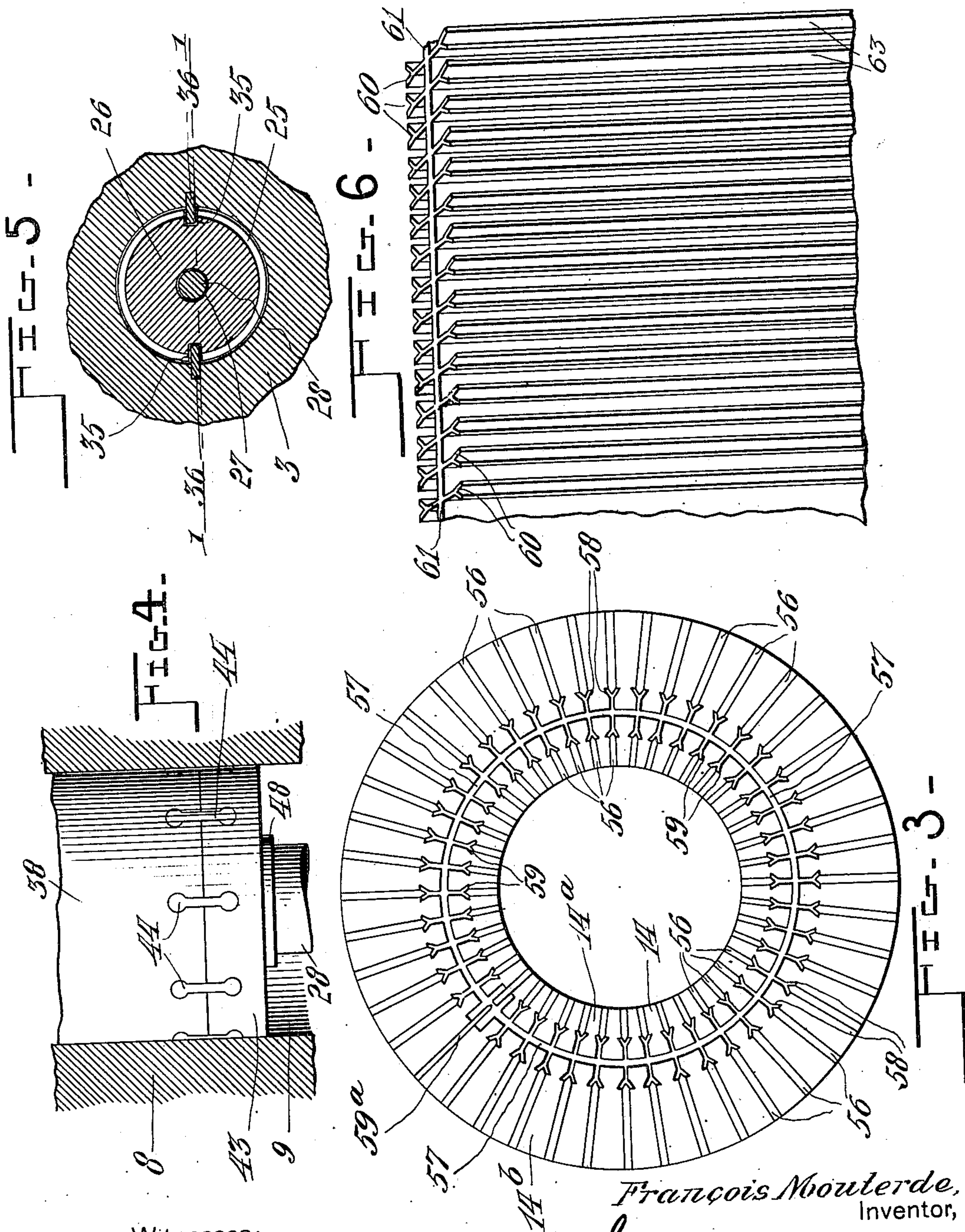
PATENTED DEC. 4, 1906.

F. MOUTERDE.

APPARATUS FOR FORMING TUBES FOR ELECTRODE PLATES.

APPLICATION FILED JULY 31, 1905.

3 SHEETS—SHEET 3.



Witnesses:  
*John F. Deufferwiel*  
*J. H. Gibbs*

By *François Mouterde,*  
*Marion & Marion*  
Inventor,  
Attorneys



# UNITED STATES PATENT OFFICE.

FRANCOIS MOUTERDE, OF LYON, FRANCE.

## APPARATUS FOR FORMING TUBES FOR ELECTRODE-PLATES.

No. 837,707.

Specification of Letters Patent.

Patented Dec. 4, 1906.

Application filed July 31, 1905. Serial No. 271,929.

*To all whom it may concern:*

Be it known that I, FRANCOIS MOUTERDE, a citizen of the Republic of France, residing at Lyon, France, have invented certain new and useful Improvements in Apparatus for Forming Tubes for Electrode-Plates; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to new and useful improvements in apparatus designed especially for manufacturing electrode-plates adapted for use in storage batteries, the object being to provide a machine which will form tubular members of lead or of soft metal, which tubular members are provided with laterally longitudinally extending lugs, which are preferably Y-shaped in cross-section, which lugs extend laterally from the tubes formed in the present machine and longitudinally thereof.

The invention consists in the combination and arrangement of parts which are shown in the accompanying drawings, all as hereinafter more fully described, and particularly pointed out in the claims, it being understood that said drawings illustrate the preferred construction, which may be departed from in the form, proportion, and minor details of parts therein shown, within the scope of the claims, without sacrificing any of the advantages of the invention.

In the accompanying drawings, in which similar characters of reference indicate corresponding parts in all the views, Figure 1 is a longitudinal vertical sectional view taken approximately centrally through the machine above the supporting-standard thereof, approximately on the plane of line 1 1 of Fig. 5. Fig. 2 is a central longitudinal fragmentary sectional view of the lower portion of the apparatus illustrated in Fig. 1, approximately on the plane of line 1 1 of Fig. 5. Fig. 3 is a top plan view of the forming-die which is used with this apparatus. Fig. 4 is a detached fragmentary and enlarged detail view showing the manner in which the plunger hereinafter referred to is connected with the head portion thereof. Fig. 5 is a fragmentary transverse sectional view, approximately on line 5 5 of Fig. 1, illustrating the manner in which the sleeve herein referred to is guided by the upper plates of the apparatus.

Fig. 6 is a fragmentary perspective view showing a portion of a sheet from which the electrodes are to be formed, and Fig. 7 is a partial elevational and partly sectional view of one of the electrodes which it is intended shall be formed.

Referring to the parts, 1 1 are supports which rise from a suitable base or floor, which supports are adapted to hold the apparatus forming the subject-matter of this invention in an elevated position, and it is to be understood that the operative mechanism hereinafter particularly described is to be supported at such position above the floor that the tubes or cylinders 2, which are formed thereby, may be forced downwardly during the process of formation by the machine, and the elevation of the machine is preferably sufficient to permit the operator thereof passing below the forming-die hereinafter referred to while standing in an erect position.

Resting upon the standards 1 is a plate 3, having laterally-projecting flanges or lugs 4, which serve as supporting means cooperating with said standards. Keyed to the plate 3 are a sufficient number of powerful posts 5, which are held connected with the plate 3 by means of wedges 6, projecting through said plate and through the posts or columns 5.

Mounted upon the columns 5 at a convenient distance above the plate 3 and connected with said columns in a similar manner is a plate 7. Connected with the columns 5 and at a predetermined distance below the plate 3 is a thicker plate 8, which is provided with a central orifice 9 therethrough, which orifice serves as a receptacle into which may be poured a sufficient supply of molten lead or other metal for the required purpose.

Spanning the distance between the plates 3 and 8 are hollow posts or columns 10, which are provided with flanges 11 abutting against the plates 3 and 8 to hold the said plates at a predetermined distance apart, and wedges 6 serve to lock the plate 8 upon the columns 5, before referred to.

Connected with the plate 8 and below the same is a recessed plate 12, which is provided with a central cavity 13, in which is held the forming-die 14<sup>b</sup>, which is illustrated in plan in Fig. 3, set-screws 15 with angular heads passing through the member 12 and bearing against the die 14<sup>b</sup>, so that said die may be adjusted to any required position centrally within the cavity 13 by means of said adjust-



ing-screws. Below the cavity 13 the plate 12 is provided with a perforation 16, which merges with the cavity 13 and completes the passage through the plate 12, but as the orifice 16 is of less diameter than the cavity 13, shoulders 17 are formed, upon which the forming-die rests.

To secure the plate 12 to the plate 8, bolts 18 with enlarged heads at the upper ends thereof extend through coincident perforations in the plates 8 and 12, while nuts 19 upon said bolts serve to hold the plate 12 in close contact with the plate 8, there being a sufficient number of the bolts 18 to hold the plate 12 rigidly in position to support the forming-die 14 in close contact with the lower face of the plate 8.

Resting above the plate 3 and traveling upon the friction-reducing ball-bearings 20 is a nut 21, which nut is provided with an internal and an external screw-thread. The nut 21 is approximately the thickness of the distance between the plates 3 and 7, and between the said nut 21 and said plate 7 there are provided cone-shaped rollers 23, which travel in channels or ways 24, formed, respectively, in the upper face of said nut 21 and the lower face of the plate 7.

Engaging the nut 21 and adapted to be driven by the internal screw-thread 25 thereof is a sleeve 26, (shown in section in Fig. 5,) said sleeve being provided with a relatively small passage 27, which extends entirely through said sleeve and in which rests the stem 28, which stem 28 is supported from the cross bar or head 29, as shown in Fig. 1, being locked to said head by means of the nuts 30, disposed relatively above and below said head. The head 29 is supported above the plate 7 upon hollow columns 31, which rest upon the plate 7 and is locked to said plate by means of the bolts 32, which are set into screw-threaded orifices in the plate 7 and are held by the nuts 33, which rest upon the upper face of the head 29, thereby supporting said head 29 in a fixed position at a predetermined distance above the plate 7 and supporting the stem 28.

The sleeve 26 is provided at relatively diametrically opposite sides with channels 35, which extend, preferably, the entire length of said sleeve, and to lock the sleeve against rotation keys 36 are inserted in said channels, said keys resting in similar channels in the sleeve and in plates 3 and 7, so that the sleeve is slidable vertically of the apparatus, as shown in the drawings, but is held against rotation.

Connected with the lower end of the sleeve 26 is a hollow plunger 38, through lugs 39 of which bolts 40 are projected, which bolts enter screw-threaded orifices in the lower portion of said sleeve and secure the plunger 38 in position upon the lower end thereof. At the upper end of the plunger 38 vent-

orifices 41 are provided, which lead from the exterior to the longitudinal passage 42 through said plunger 38.

Secured to the plunger 38, as shown in Fig. 4, is a head portion 43, there being coincident keyhole-shaped recesses formed in the plunger and said head, into which locking-keys 44, having enlargements upon opposite ends thereof, are inserted for the purpose of locking the head 43 to the plunger 38.

As will be noted in Fig. 2, the passage 42 through the plunger 38 is enlarged at the lower end of said plunger, and the head 43 is provided with a central cavity 45, which is of substantially the diameter of the enlargement of said passage 42, but the head 43 is provided also with an extension of the chamber 45, which is of less diameter than said chamber, whereby an annular shoulder 46 is formed, which serves as a support for the lower member 47 of the compound packing-ring which is provided within the cavities of the plunger and head. The member 47 of this packing-ring is of greater diameter near its inner end, and has an attenuated collar 48, which projects for a short distance below the head 43, as shown in Figs. 2 and 4. Within the enlarged cavity of the plunger 38 referred to there is another packing-collar 49, which is held in a relatively fixed position in the plunger 38, and between these packing-collars there is placed a packing 50, preferably of asbestos, which packing is designed to prevent the passage of molten metal through the passage 42, before referred to; but owing to the fact that in spite of the packing 50 the molten metal will be forced beyond said packing and upwardly through the passage 42 the vent-openings 41 are provided through the upper portion of the plunger 38, so that such metal may be readily removed after it has found its way through the plunger 38.

The lower end of the stem 28 is perforated and screw-threaded longitudinally, as shown in Fig. 2, and in this screw-threaded perforation there is secured the attenuated screw-threaded upper end 52 of the lower extension 28<sup>a</sup> of said stem.

Resting upon the lower portion of the stem 28<sup>a</sup> and supported between the portions 28 and 28<sup>a</sup> is the inner portion 14<sup>a</sup> of the forming-die 14, (shown in a relatively exaggerated scale in Fig. 3,) the die 14 comprising the parts 14<sup>a</sup> and 14<sup>b</sup>, of which the inner part 14<sup>a</sup> is held between the stem portions 28 and 28<sup>a</sup>, being locked in a fixed position therebetween, while the outer portion 14<sup>b</sup> of this die is supported upon the annular shoulder 17 of the plate 12. This die is of peculiar construction and the outer portion 14<sup>b</sup> is cut away, as shown in the sectional view, Fig. 1, to provide the cavity 55. The upper faces of the sections 14<sup>a</sup> and 14<sup>b</sup> of the die are provided with channels, in which are held radi-



ally-extending ribs 56, which ribs, as will be noted in Fig. 3, are provided with beveled adjacent end portions in alinement.

The die-sections 14<sup>a</sup> and 14<sup>b</sup> are supported as described and are of such relative size that an annular passage 57 is provided between the adjacent edges of said dies, and from this passage 57 there extend in opposite directions radially Y-shaped passages 58 and 59, said passages extending radially from the passage 57 for the entire length of said passage 57, except at one point, where the passage 57 is intersected by the slitting-knife 59<sup>a</sup>, which knife is provided with a beveled end projecting into said passage 57 and is adapted to serve as a convenient means for cutting a channel into the tube 2, which is formed by the machine, so that a knife or other slitting-tool may be passed into the channel formed by the knife 59<sup>a</sup> to sever the tube longitudinally thereof, so that it may be flattened to the form shown in Fig. 6, in which the Y-shaped lateral extensions 60 extend longitudinally of the plates 61, with which they are integrally formed in the first instance; but after the tube has been slit and flattened to the form shown in Fig. 6 said plate is then bent so that the Y-shaped extensions 60, instead of extending longitudinally of the plate 61, will extend transversely thereof or circumferentially of the tube 62, (illustrated in Fig. 7,) after which metal or filler may be inserted in the pockets 63, which are disposed circumferentially both within the tube 62 and exterior thereof.

The nut 21 is provided with the exterior screw-thread, as shown in Fig. 1, extending circumferentially thereof, so as to adapt it to engage with and be actuated by a suitable worm or other driving means.

The operation of the machine is as follows: Molten metal being poured into the metal-receptacle while the plunger is in an elevated position and the forming-die 14 properly centered with relation to the stem 28 the nut 21 is rotated by any suitable means, (not shown,) so as to project the sleeve 26 and the plunger 38 in a direction toward the plate 8, thereby forcing the plunger 38 into the fluid metal therein and forcing such metal through the passage 57, between the inner and outer die members, at the same time forming the Y-shaped branches 60 integral with the metal which is forced

through the passage 57, thereby forming the tube 2, (shown in Fig. 1,) which tube is cut to predetermined lengths and manipulated, as hereinbefore indicated. When the plunger 38 is forcing the metal between the die-sections, there will be an upward pressure between the plunger and the stem 28, which upward pressure will force the slidable packing-collar against the packing 50, thereby compressing said packing to a suitable extent and retarding to a great degree the passage of the fluid metal between the plunger 38 and the stem 28; but to provide for the removal of any metal which may pass this packing the vent-orifice 21 is provided for the removal of any metal which finds its way past the packing.

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

1. In an apparatus of the character described, a metal-receptacle, a die supported in alinement with the discharge end thereof, a slitting-knife carried by said die, a stem on which a portion of said die is mounted, and a plunger slidable on said stem.

2. In an apparatus of the character described, a metal-receptacle, a die supported in alinement with the discharge end thereof and provided with Y-shaped channels, a stem extending through said receptacle, a plunger slidable on said stem, and a packing composed of a fixed collar carried by the plunger, a slidable collar, and a filler interposed between said stem and plunger.

3. In combination with a supporting framework, a sleeve, means for reciprocating the sleeve, a hollow plunger secured to the sleeve and provided with a recess, a head keyed to the plunger and provided with a recess, a packing-ring disposed on the plunger in its recess, a packing-ring disposed on the head in its recess, a filling of asbestos disposed between the packing-rings, a stem disposed through the sleeve, the plunger and the head, and a die supported below the head.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

FRANCOIS MOUTERDE.

Witnesses:

FREDERICK H. GIBBS,  
JOHN T. DEUFFERWEIL.