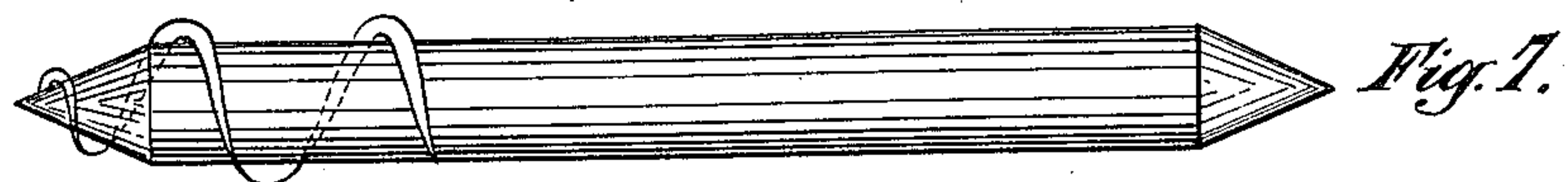
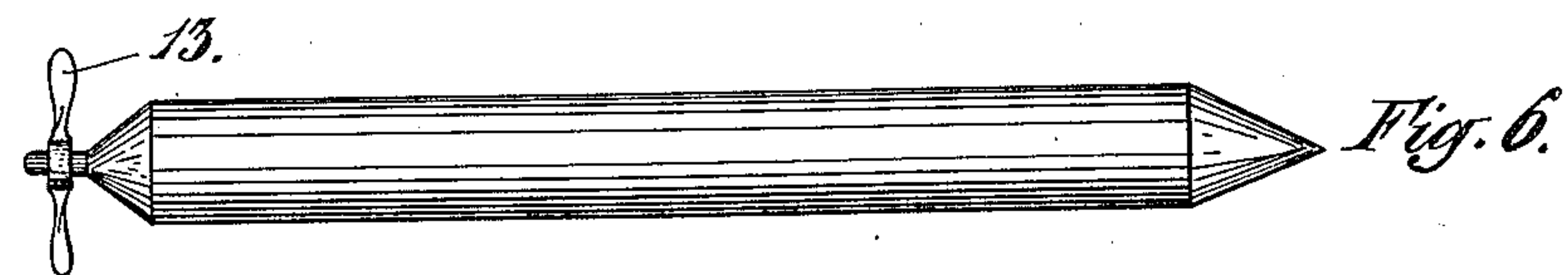
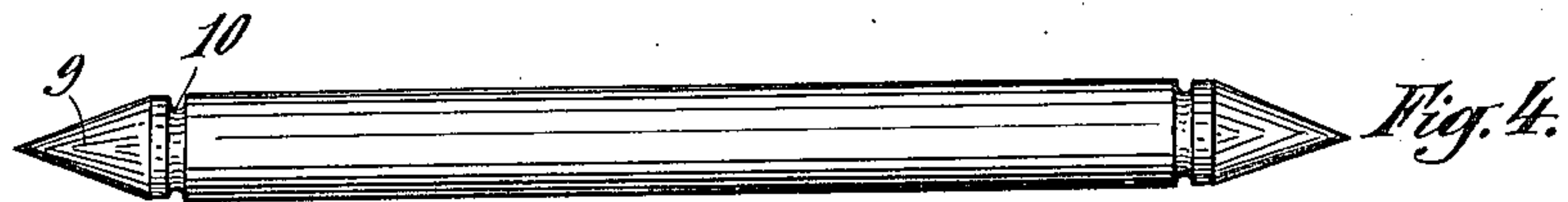
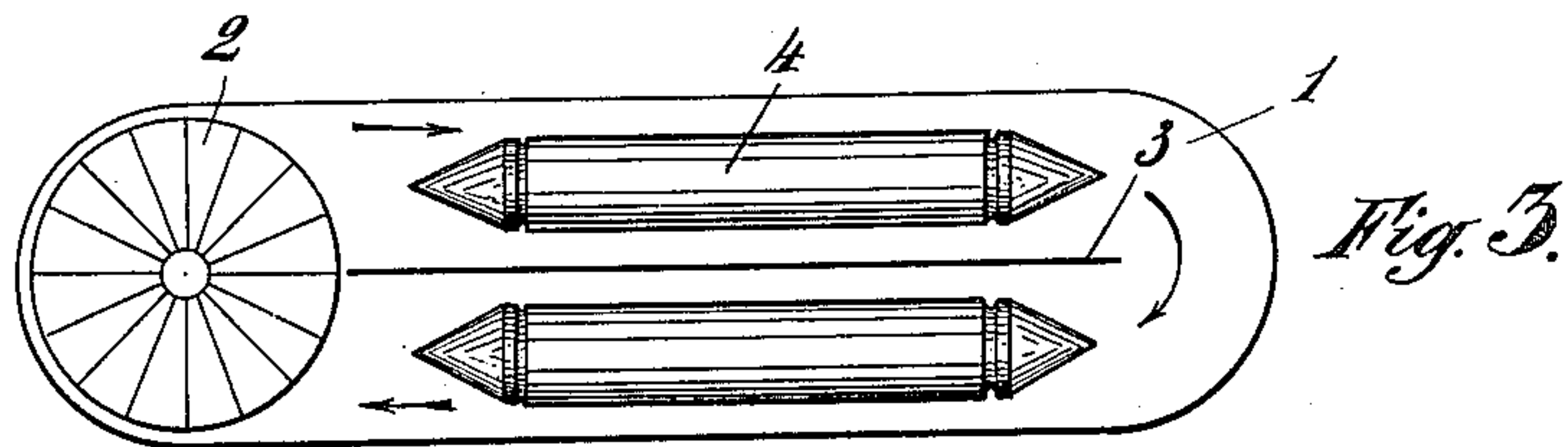
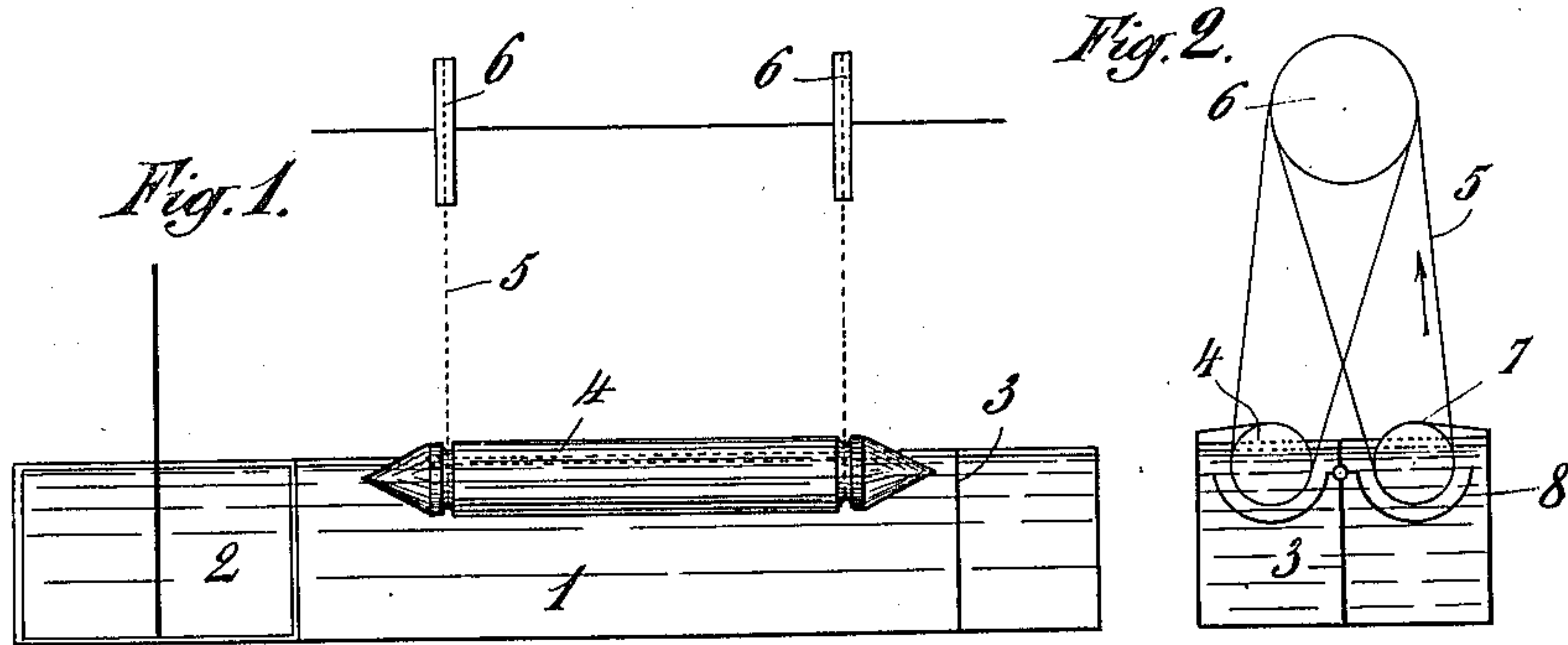


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ELECTROLYTIC APPARATUS.  
APPLICATION FILED MAY 11, 1907.

903,164.

Patented Nov. 10, 1908.



Witnesses.

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# UNITED STATES PATENT OFFICE.

PAUL BORGNET, OF LIEGE, BELGIUM.

## ELECTROLYTIC APPARATUS.

No. 903,164.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed May 11, 1907. Serial No. 373,158.

*To all whom it may concern:*

Be it known that I, PAUL BORGNET, a-sub-  
ject of the Kingdom of Belgium, residing in  
Liege, in Belgium, have invented certain  
5 new and useful Improvements in Electro-  
lytic Apparatus; and I do hereby declare the  
following to be a full, clear, and exact de-  
scription of the invention, such as will enable  
others skilled in the art to which it apper-  
10 tains to make and use the same, reference  
being had to the accompanying drawings,  
and to figures of reference marked therein,  
which form a part of this specification.

This invention relates to an electrolytic  
15 apparatus in which it is possible to utilize  
currents of great intensity because the elec-  
trolyte moves rapidly relatively to the ca-  
thode, and the latter is alternately immersed  
in and caused to emerge from the said elec-  
20 trolyte as a result of the movement of rota-  
tion imparted to it.

This apparatus comprises broadly a tank  
in which the electrolyte is given a movement  
of rapid displacement and upon which the  
25 cathode floats, this cathode having imparted  
to it a movement of rotation. In addition  
to the possibility of using intense currents  
the apparatus presents the advantage of  
being exceedingly simple in construction and  
30 of consuming relatively little motive power.

Figures 1, 2 and 3 represent in longi-  
tudinal section, cross-section and in plan, an  
apparatus in accordance with the invention  
used for making a galvanic deposit on a  
35 cylindrical mandrel. Figs. 4 to 7 represent  
various forms of mandrels and floats.

A tank 1, the angles of which are rounded  
off and which is partly divided by a longi-  
tudinal partition 3, is provided at one of its  
40 ends with a vane wheel 2 mounted on a  
vertical shaft to which a movement of rapid  
rotation is imparted, and which causes the  
electrolyte to circulate in the direction indi-  
cated by the arrow. Upon the electrolyte  
45 displaced in this manner, mandrels 4 float;  
at each of their ends they receive a belt 5  
driven by a pulley 6, the axis of which is  
parallel to the longitudinal axis of the tank  
1. The driving belts prevent the mandrels  
50 from being carried along by the current pro-  
duced by the wheel 2. The galvanic deposit  
takes place upon these mandrels, which are  
rendered suitably conducting, by an electric  
current supplied through the contacts 7.

Anodes 8 are of course arranged in prox- 55  
imity to them.

It will be obvious that owing to this double  
movement of the cathode and of the elec-  
trolyte each portion of the cathode will be  
given a velocity relatively to the electrolyte 60  
equal to the composite velocity due to these  
two movements. It is also obvious that each  
portion of the cathode will be alternately  
immersed in the electrolyte and will then  
emerge, the result being to facilitate the lib- 65  
eration of the gaseous bubbles.

It is obvious that the displacement of the  
electrolyte might be realized by any other  
appropriate method; for example, instead  
of a wheel, a pump or a steam jet might be 70  
utilized.

Fig. 4 represents an advantageous form of  
mandrel for the manufacture of tubes. It  
terminates in points 9 in order to oppose less  
resistance to the stream of electrolyte. The 75  
belts are received in grooves 10.

When it is required to make a deposit  
upon a non-floating body, it is combined  
with one or more floats 11, as shown in Fig.  
5 in the case of a solid shaft 12. It will of 80  
course be understood that the form and di-  
mensions of the floats and the position of the  
grooves for the reception of the belts actu-  
ating the cathode will vary with the form of  
the bodies to be covered. The belts 5 may 85  
be dispensed with and the ends of the man-  
drel or of the floats may be provided with  
propeller screws 13 or with helicoidal sur-  
faces 14 as shown in Figs. 6 and 7; the action  
of the stream of electrolyte upon these parts 90  
will be sufficient to impart the required rota-  
tion to the cathode. In this case it is obvi-  
ously necessary in order that the cathode  
may not be displaced by the stream to pro-  
vide a bearing for one of its ends against a 95  
fixed stop.

This apparatus is equally suitable for the  
extraction of metals from their ores, and for  
any other applications of electrolysis, as for  
galvanic deposit properly so-called. It may 100  
also be utilized with advantage for the pro-  
duction of electric current seeing that its prin-  
cipal characteristic is to avoid polarization.

If it is not desired to obtain the advan-  
tages resulting from the alternate immersion 105  
and emersion of the cathode or of a portion  
of the cathode, the floats might be arranged  
vertically.



Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

5 1. In an apparatus for electro-deposition, a vessel for containing the electrolyte, a cathode arranged to float unsupported in the bath, an anode in the bath arranged in proximity to the floating cathode, and a conductor arranged to bear against the cathode.

10 2. In an apparatus for electro-deposition, a vessel for containing the electrolyte, a cathode arranged to float unsupported in the bath, an anode in the bath arranged in proximity to the floating cathode, a conductor arranged to bear against the cathode, and means for causing a circulation of the electrolyte.

15 3. In an apparatus for electro-deposition, a vessel for containing the electrolyte, a cathode arranged to float unsupported in the bath, an anode in the bath arranged in proximity to the floating cathode, a conductor arranged to bear against the cathode and means for causing the rotation of the cathode.

20 4. In an apparatus for electro-deposition, a vessel for containing the electrolyte, a cathode arranged to float unsupported in the bath, an anode in the bath arranged in proximity to the floating cathode, a conductor arranged to bear against the cathode, means for causing a circulation of the electrolyte, and means for causing rotation of the cathode.

5. In an apparatus for electro-deposition, a vessel for containing the electrolyte, a cathode arranged to float unsupported in the bath, an anode in the bath arranged in proximity to the floating cathode, a conductor arranged to bear against the cathode, and means on the cathode for causing its rotation from the movement of the electrolyte.

35 6. In an apparatus for electro-deposition, a vessel containing an electrolyte, means for causing a circulation of the electrolyte, a cathode organized to float in the electrolyte, and means on the cathode for causing its revolution by the engagement of the moving stream of the electrolyte.

40 7. In an apparatus for electro-deposition, a vessel containing an electrolyte, means for causing a circulation of the electrolyte, a cathode organized to float in the electrolyte, and means on the cathode for causing its revolution by the engagement of the moving stream of the electrolyte.

45 In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

PAUL BORGNET.

Witnesses:

GEORGES VANDER HAUGHEN,  
LEONARD LEVA.