

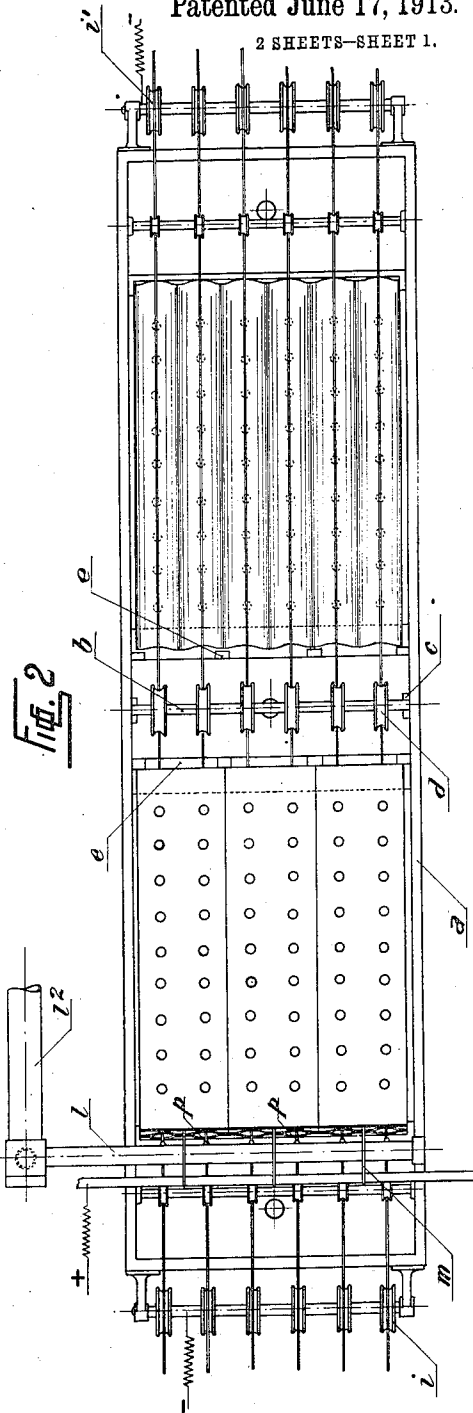
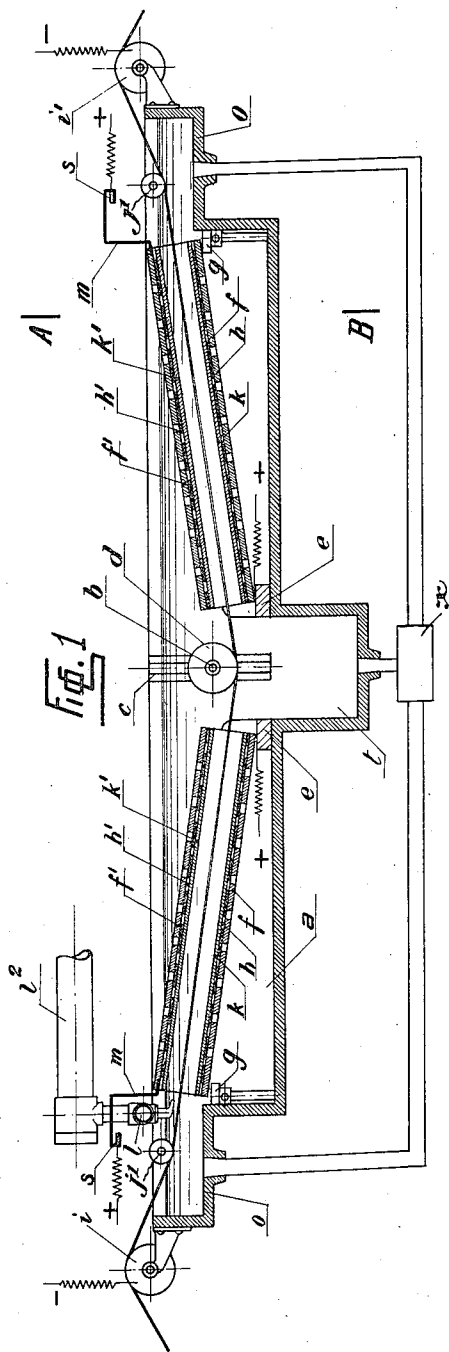
F. WERTH.
 APPARATUS FOR UNIFORMLY COATING STRIPS OF METAL, WIRE, AND THE LIKE UNDER
 CONTINUOUS ACTION.

APPLICATION FILED SEPT. 4, 1912.

Patented June 17, 1913.

1,065,090.

2 SHEETS—SHEET 1.



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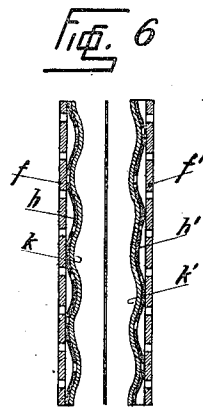
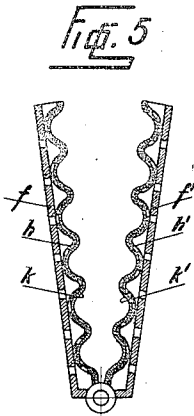
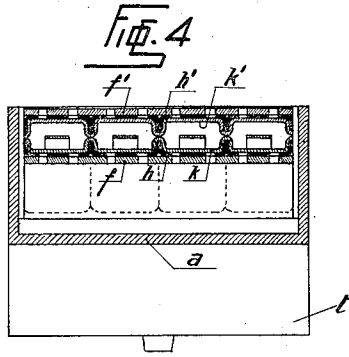
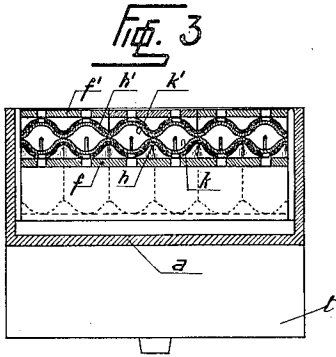
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2 SHEETS—SHEET 2.

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UNITED STATES PATENT OFFICE.

FEDERICO WERTH, OF MILAN, ITALY.

APPARATUS FOR UNIFORMLY COATING STRIPS OF METAL, WIRE, AND THE LIKE
UNDER CONTINUOUS ACTION.

1,065,090.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed September 4, 1912. Serial No. 718,549.

To all whom it may concern:

Be it known that I, FEDERICO WERTH, a citizen of Germany, residing at 18 Corso Vercelli, Milan, Italy, have invented certain new and useful Improvements in Apparatus for Uniformly Coating Strips of Metal, Wire, and the Like Under Continuous Action, of which the following is a specification.

10 In producing galvanic deposits on wires, strips of metal, and the like under continuous action it is of importance that the distance between the anodes and the cathode shall be equal on all sides and as far as possible remain so in order that an equal deposit may be produced on all sides in a short time. It is further important that the width and length of the baths shall be as small as possible and that a large number of wires can be galvanized in the bath at the same time. For this purpose it has been suggested that tubular anodes should be employed, but this arrangement also presents many disadvantages. The present invention is intended to obviate these disadvantages.

15 In the accompanying drawing an example of the particular arrangement is illustrated, Figure 1 being a longitudinal section, Fig. 2 a plan, Fig. 3 a section through A—B of a modified form of the apparatus shown in Fig. 1. Fig. 4 being likewise a section through A—B of a modified form of the apparatus shown in Fig. 1. Fig. 5 is a diagrammatic representation of an altered form of the invention and Fig. 6 a form of the apparatus for treating sheet metal plates.

20 —a— is a bath of any preferred length and width, but of little depth, at each end of which is an extension —o— and in the bottom thereof a well —t—. In the middle of the bath a shaft —b— made of insoluble and good insulating material is mounted in the guides —c— so that it can be raised. This shaft carries the current conducting or nonconducting undetachable rollers —d— for the guiding of the wire. Below, mounted on suitably formed transverse blocks —e— are two plates —f— in which holes are formed. These plates are nearly as wide as the bath but longer than half the length of the bath, so that they can lie obliquely right and left against the movable supports —g—

at the ends of the bath —a—. It is obvious that the foundation for the obliquely lying plates may be otherwise than as indicated. 55 On each of the two plates the anode —h— constructed in the form of a corrugated sheet of metal rests which has as many longitudinal corrugations or channels as there are wires to be carried through the bath. This anode is suitably made of copper covered with lead but may consist of any other metal that is to be deposited. This corrugated metal plate is likewise provided with holes. Above this corrugated metal a material —k— which 65 readily absorbs the liquid and allows the current to pass easily is suitably fixed, so that it is adapted to the form of the anode channels and lies firmly against them. On each corrugated sheet another rests, exactly like the lower perforated corrugated sheet —h'—, 70 with which however the material —k— is fixed downward, the corrugated sheets being arranged one on the other so that the semi-circular hollows in the one form in combination with those in the other complete tubular passages. Above the corrugated sheet —h— moreover is a perforated cover —f'—. This cover, however, does not consist of a single piece. Two or three channels at the most 80 are united in one cover and together form the whole width of the lower anode. This separation is an advantage for facilitating the introduction of the wires and examination in case of breakage. 85

When the strips, wires, and the like are sufficiently prepared they are conveyed over the wheels —i— (made of brass, bronze or the like) connected with the negative pole of the circuit, and over the rollers —j'— 90 and then, when the covers —h'—k'—f'— are removed, placed in the descending corrugations, brought below the properly adjusted guide wheels —d— and conveyed through the ascending corrugations to the rollers —j'— and the negative, or current carrying off wheels —i'. The different covers are then put on and the apparatus is ready for action. 95

In order that the wires, strips of metal and the like shall be carried precisely through the middle of the anode passages, the wheels —i— and —i'— may be made adjustable, or this regulating may be effected by raising, 100

and lowering the anode plates, the support —*g*— being fixed higher or lower against the ends of the bath.

The positive conductor is directly connected with the lower corrugated anode —*h*— and the upper cover anodes —*h'*— are suspended by means of hooks or clamps —*m*— on a positive conducting bar —*s*— lying transversely above, but may be conductively connected with one another without conducting bars.

As a matter of course the corrugated metal sheets may be of different lengths, and different baths may follow one another, as may be required for the galvanizing operation.

The position of the corrugated anodes should not be too greatly inclined, in order that the wires, strips of metal, and the like, may only have to bend slightly. The bronze wheels should be as large as possible so as to insure ample contact.

If strips of metal and the like, are to be galvanized, a rectangularly corrugated metal sheet of the kind shown in Fig. 4 is employed and adapted to the dimensions, the rectangular channels being so arranged that they can be easily moved in order to keep the anode always at the same distance from the strips, and the like, on all sides. The passages may also be differently shaped according to the kind of articles to be galvanized. The distance apart of the anodes can also be easily regulated, the upper corrugated anode being arranged so that it can sink into the lower. The distance apart can thereby be easily regulated so that it is possible to keep within the most precise calculation for the different thicknesses of wire.

As a matter of course the channel shape anodes, whether for the wires or for the strips of metal, may consist of the lower halves only that is to say the channels may be entirely open above. This can be best effected by giving the channels a trapezium shape cross section narrowed at the top. The deposit on the wires or strips is effected quite satisfactorily also with this form of construction. The corrugated anodes may moreover be arranged singly that is to say not be joined together in groups. The surveillance and the management of the apparatus are thereby considerably facilitated. The advantages of this arrangement are, in addition to those above mentioned the constantly uniform distance apart of the anodes, the greatest possible nearness and regulation of the distance apart of the anodes thereby insuring uniform and quicker galvanizing of different thicknesses of wire, the great saving of space, the large saving of material in anodes and conductors, the slight bending of the wire, strips and the like, carried through the apparatus, the security

against short circuiting when the wire breaks through the insulating material put on the anodes, the possibility of the constant change of the fluid and the easy drawing off of the gases through the perforated anodes and the movement of the fluid.

The fluid in the bath can be always kept in motion by blowing in air or the like. It has been found, however, that the more quickly the fluid flows in the tubular passages, the greater may be the supply of current, the more quickly is the deposit effected in a smooth homogeneous layer. It is therefore advantageous to construct the apparatus according to the drawings and to convey the electrolyte to the pipe —*l*— by means of a pump out of an extra tank —*t'*— from which pipe it is pumped through the openings —*p*—, which are arranged in equal numbers to the corrugations directly into and through the tube like passages. It collects in the middle and is pumped from there again to the extra tank, for the purpose of being brought there to the precise composition and so conveyed to the anode passages always in the same state. This movement of the liquid is more easily effected in the special passages or channels, and it is possible to regulate the speed at which the liquid flows through.

The apparatus can also be arranged as indicated in the drawing so that the liquid in the bath flows from the bath extensions —*o*— only into the channels and is collected in the recess —*t*—, whereupon it is then raised again by a pump *x* into —*o*— and so on. The result of this is that the guide wheel —*d*— can also be made conductive without being attacked by the current, as it would be withdrawn from the liquid.

The same apparatus is of course also capable of being employed for the purpose of cleaning and removing grease from wire. It can likewise be used for the galvanizing of single bars, tubes, figured iron, and the like.

In many cases it may also be of advantage to employ several instead of only two anode courses which are arranged alternately descending and ascending in succession.

Fig. 5 of the accompanying drawing illustrates another form of the invention, in which the insulated anode comprises corrugated sheets which are connected adjacently to one another with the perforated plates in the manner of a hinge joint or so as to fold and the wires, strips and the like can be carried in a vertical row through the tubular courses formed when the anode plates are folded together.

The apparatus also can be used for galvanizing metal plates of all kinds and of any shape, but the galvanizing is best effected in the vertical position. For example, corru-

gated sheets after being corrugated can be galvanized, and likewise figured plates after they have been shaped. As is well known it is of advantage in connection with the galvanic deposit that the strength and potential of the current should be decreased or increased at short intervals and this can also be effected by placing the anodes at varying distances apart. It is also possible, as shown in Fig. 6 of the drawings, to galvanize smooth sheets on one side or on both sides by laying the same on slightly undulated anodes insulated in the manner described, whereby the sheets can be regulated at the same time with regard to the distance apart and the retention in the same plane, and any kind of mechanical device be arranged which reciprocates either the anodes or the sheets during the galvanizing process quite slowly and only to the extent of the width of half a corrugation. It is also possible to cover the sheets instead of the anodes with the insulating material and then arrange them between the non-insulated anodes, whereby the condition of the insulation can be more easily and precisely inspected. Fixed insulating walls may likewise be placed between the anode and the cathode. The lateral movement, however is only possible in connection with smooth sheets, while in the case of corrugated and figured sheets an apparatus is arranged which moves the anodes slowly and to a slight extent from and to the cathode. By this movement a constant change of the liquid and the removal of gas bubbles, impurities, and the like are likewise assured. A double movement of the anodes may also be provided for, both kinds of movement being employed at the same time. I have used herein the term "galvanizing" not in its popular sense as indicating coating with zinc only, but as indicating coating by galvanic action with any suitable metal or combination of metals.

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

1. An apparatus for coating metal, comprising an electrolytic bath, an anode supported at an angle of inclination in said bath and consisting of a plurality of lower channeled members and a plurality of upper removable channeled members, and means for moving the metal to be coated through the channels formed by said anode.

2. An apparatus for coating metal, comprising an electrolytic bath, two sets of anodes supported at an angle of inclination to the center-line of the bath, each anode consisting of a plurality of lower channeled perforated members and a plurality of upper removable channeled and perforated members, means for moving the metal to be coated through the channels of said anodes, and means located between the lower ends of the pairs of anodes for guiding the metal to be coated.

3. In an apparatus for coating metal, the combination of an electrolytic bath having extensions, two sets of anodes supported in inclined position in the bath, said anodes consisting of a plurality of lower and upper channeled and perforated members, means for moving the metal to be coated through the channels of said anodes, an adjustable guide-wheel located between the lower ends of the pairs of anodes, a well at the center of the electrolytic bath, and means for pumping the electrolyte from said well to the extensions at opposite ends of the electrolytic bath.

In testimony whereof I have affixed my signature in presence of two witnesses.

FEDERICO WERTH.

Witnesses:

SYOSCAR PUMPEL,
CHAS. M. CAUGY.