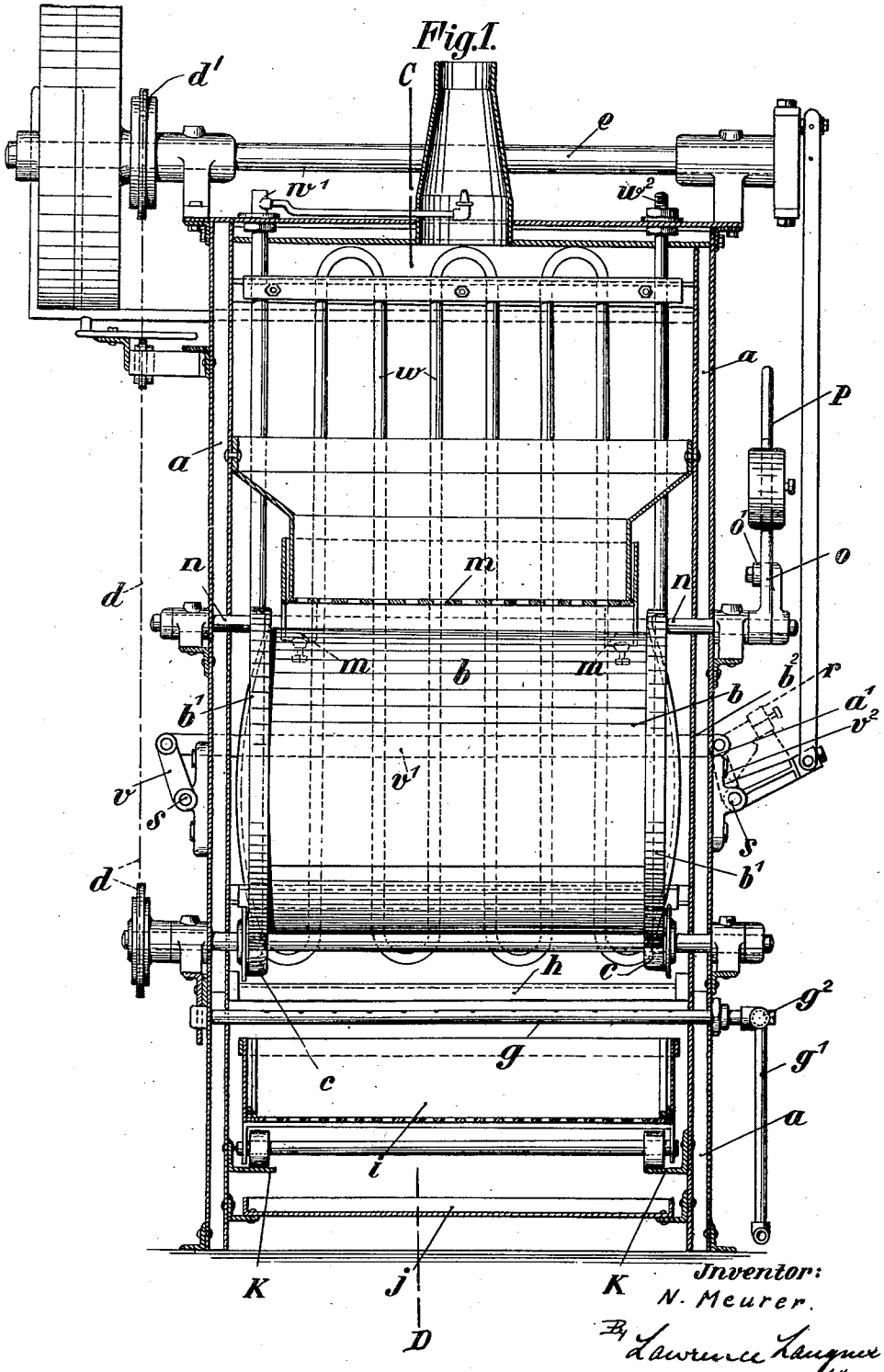
March 9, 1926. 1,575,926

N. MEURER

PLATING DEVICE

Filed Nov. 19, 1921 3 Sheets-Sheet 1

Fig. 1.



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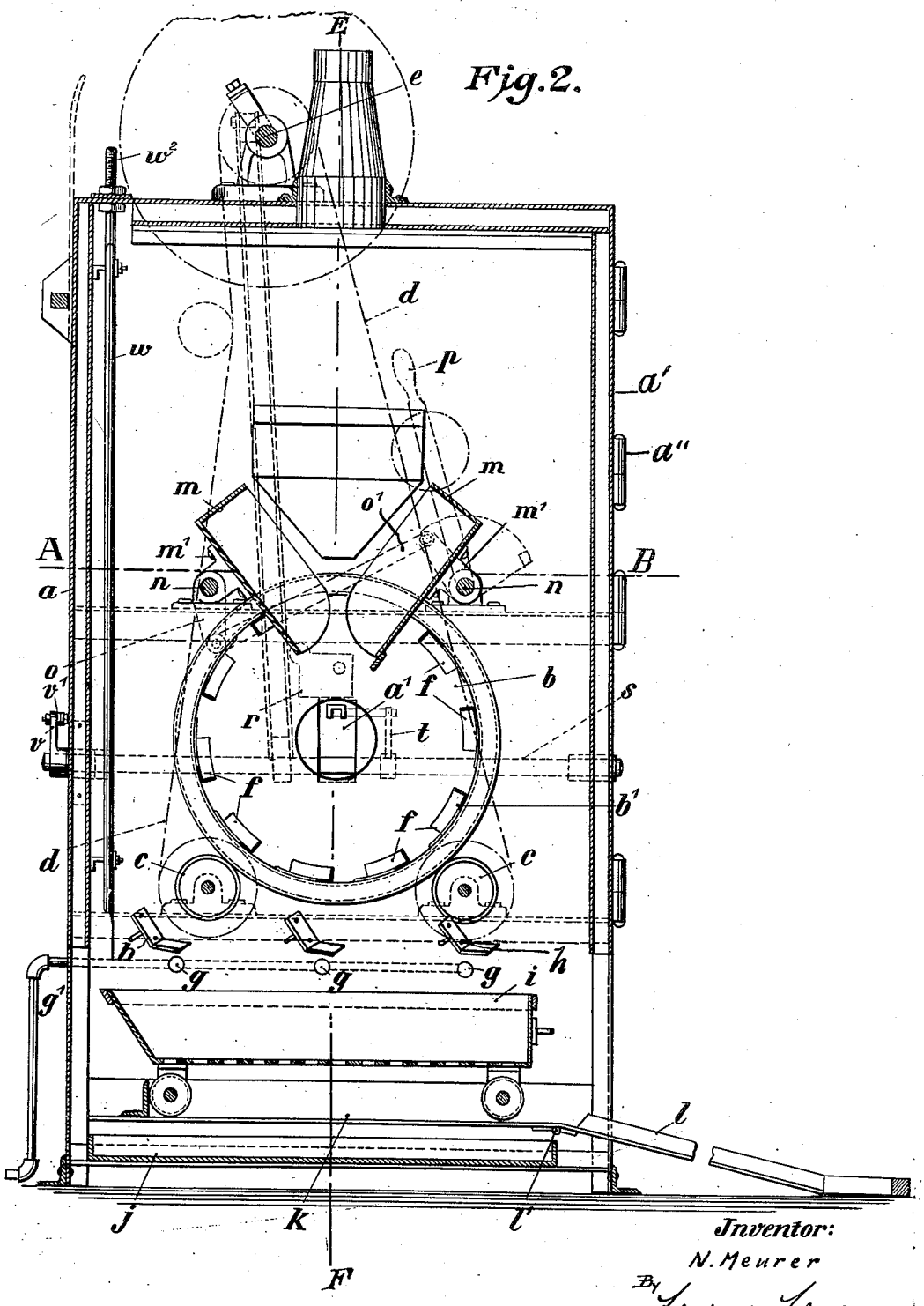
March 9, 1926. 1,575,926

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PLATING DEVICE

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Fig. 2.



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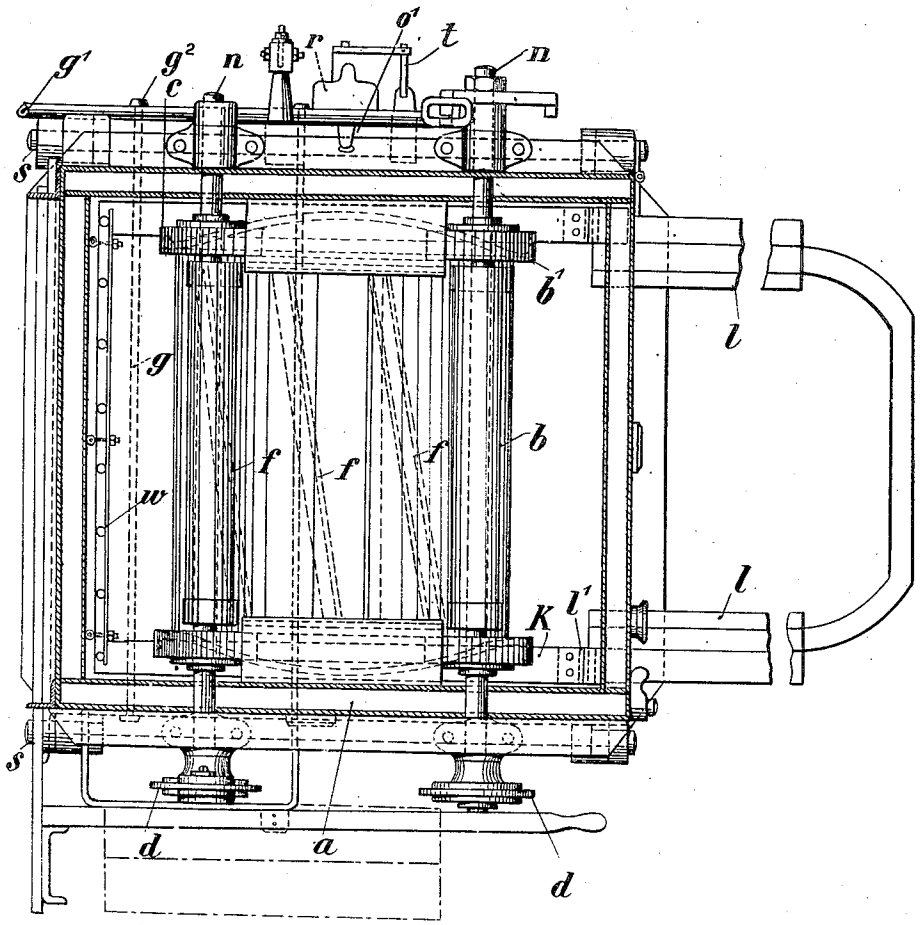
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PLATING DEVICE

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Fig. 3.



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Patented Mar. 9, 1926. 1,575,926

UNITED STATES PATENT OFFICE.

NIKOLAUS MEURER, OF BERLIN-TEMPELHOF, GERMANY, ASSIGNOR TO METALLOGEN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, OF BERLIN-NEUKOLLN.

PLATING DEVICE.

Application filed November 19, 1921. Serial No. 516,489.

To all whom it may concern:

Be it known that I, NIKOLAUS MEURER, a citizen of the German Republic, residing at Berlin-Tempelhof, in the county of Berlin and State of Prussia, Germany, have invented certain new and useful Improvements in Plating Devices (for which I have filed application in Germany Nov. 6, 1920, No. M71308); and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to a device for plating objects of all descriptions, but more especially metal objects.

Plating by means of the galvanic process or immersion as well as by spraying the object with liquid metal is known. In every plating process it is highly important that the coating adheres fast to the metal, not coming off in the course of time as a result of heat, weather influences, shocks or the like. The metal coating must unite and combine with the surface plated so closely that all requisites are met.

Perfect adhesion is attained in the first place by thoroughly cleaning the surface and choosing proper metals, as for instance such as tend to form alloys with the metal of which the object coated is formed. But this alone is not always sufficient to produce satisfactory results.

The present invention, however, permits of permanent adhesion and of giving objects a coating suitable for all needs by allowing metallic vapor to act on the surface of the metal before the plating takes place.

The metal to be coated is preferably preheated as this intensifies the action of the metallic vapor. The temperature used for preheating depends both on the kind of object to be plated as well as on the plating metal and the vapor destined to act on the object. The most suitable temperature to use must be determined by tests.

If the surface of the object to be plated is exposed to the metallic vapor for a certain length of time, the plating itself can take place at once. The metallic vapor preferably consists of the same metal as is used for the ultimate plating process, or at least of such metals as form alloys with the surface of the object to be plated.

The plating operation itself can be performed according to any of the known processes. The process preferably employed in connection with the present invention, however, is the spraying process, because this involves heating the metals to a rather high temperature and the devices used for spraying the liquid metal can then also be made to eject the vapor with which the objects are treated prior to the application of the ultimate plating.

Finally, in the spraying process, it is possible to treat the surface with the metallic vapor and to coat it with liquid metal at the same time.

The treatment of the objects to be plated is best performed in a device comprising a case containing the various compartments for the various operations.

A device of this description is shown in the drawing, in which

Fig. 1 is a sectional view of the device on the line E—F of Fig. 2,

Fig. 2 is a sectional view on the line C—D of Fig. 1,

Fig. 3 is a cross section on the line A—B of Fig. 2.

Referring to the drawing the device consists of a chamber with double side walls a and doors a' which open on hinges a'' shown at the right in Fig. 2. The space between the plates that form the double walls is preferably filled with a heat insulator to prevent the escape of heat. Arranged in the lower part of the chamber is a revolving drum provided with rings b^1 at both ends that rotate on rollers c fixed on shafts journalled in the side walls a a of the chamber and driven by a sprocket wheel and a chain d. The motion of the chain d is derived from a sprocket wheel d' keyed to a shaft e journalled at the top of the chamber, as shown in Figs. 1 and 2. The objects to be coated or plated are introduced into the drum through a hopper arranged at the top of the drum and consisting of two shovel-like portions m provided with short rocker arms m' arranged to be rocked around pivots consisting of shafts n. The rocker arms m' are fixed to the shafts n and the latter have arms o attached to their ends and connected by a connecting rod o'. By means of a handle p, fixed to the end of the right hand shaft n of Fig. 2,

the hinged shovel-like halves *m m* of the hopper can be swung upward from their oblique positions shown in Fig. 2 into a horizontal position, in which they form a horizontal dish. The opening in the drum *b*, through which the articles to be plated have been introduced by means of the hopper *m*, may then be closed by any preferred form of door, such door being an obvious expedient, not being shown in the drawing.

The inner surface of the drum is provided with longitudinal projections or ribs F which serve to carry round and stir the objects in the drum. The two ends of the drum are closed except at their central portions, where there are openings *a'* through which the coating metal is sprayed.

Arranged beneath the drum are a number of gas pipes *g* with holes at the top and stop cocks g^2 for stopping and turning on illumination gas taken from a supply pipe *g'*. The gas flames produced by the gas jets issuing from the holes in the pipes *g* heat the interior of the chamber or case and the revolving drum *b*. Deflecting devices *h* are provided by means of which metallic dust that issues from the drum *b* is deflected so as to prevent it from clogging the jets or holes in the pipes *g*.

Arranged beneath the pipes *g* and the drum is a car *i* constructed of perforated sheet metal and whose wheels run on a track *k* hinged to an oblique track *l*. The hinges *l'* permit of the car *i* being tilted at its rear end to cause it to travel out of the chamber *a* onto the oblique track *l*. Beneath the track of the car there is a drawer *j* in which the metallic dust that falls to the bottom of the chamber is collected so that this dust can be conveniently removed.

The operation of preheating the objects to be plated or coated is performed in the space above the drum *b*, and to this end the two rocking shovel-like halves of the hopper are perforated so as to allow the heated vapor that rises from the drum to flow freely into the hopper when its two halves are swung up into their horizontal position so as to form a horizontal dish (Fig. 1) with a middle dividing line. When the halves of the hopper have been raised by means of the weighted lever *p* so as to form a horizontal dish, the cold parts or articles to be plated, which are thrown in through the top of the chamber, are held by the dish, and the hot gases and air rising from the lower portions of the chamber then preheat the said articles and drive out the latent gases such as air, hydrogen, etc., bound in them and cause their pores to be opened so as to make them more capable of absorbing or receiving the metallic coating that is to be applied to them. The objects heated in the dish *m* are plated to a certain extent before they reach the drum. After having operated for a time the entire casing *a* is filled with heated metal dust and vaporized metal which acts on the articles on the dish *m*, to give them a preliminary light coating, and prepare them for the main coating This preheating operation is an important feature of the invention and one of the principal means by which a good adhesion of the metallic coating is obtained.

The metallic spray squirted onto the objects in the drum is introduced into the latter through the central holes *a'* in the sides of the drum. The type of spraying apparatus used forms no feature of the present invention and any preferred type of such apparatus may be employed. If desired, the spraying operation can be performed by a single apparatus and through a single hole *a'* in one side of the drum.

The nozzles of the spraying apparatus are arranged to protrude through the central openings *a'* in the side walls of the drum and may be arranged to be moved to and fro by oscillatory rotary movements imparted to shafts *s* journalled in bearings attached to the outer walls of the chamber *a*. The spraying apparatus *r* (Fig. 3) may be mounted on supports *t* (Fig. 3) attached to the oscillating shafts *s* whose motion is derived through rocker arms *v*, v^2 by any suitable connecting means from the shaft *e*. The rocker arms *v*, v^2 are connected by a link or rod *v'*. While the nozzles of the spraying apparatus are thus oscillated by the shafts *s* the jets of liquid metallic spray or hot metallic dust, are continually projected through the entire length of the drum so that, on account of the stirring effect of the stirring ribs *f*, the metallic spray is applied to the surfaces of all of the objects in the drum. As the objects have been preheated and had their pores opened, and latent gases have been driven out of them by the preheating operation carried out in the dish *m* before they were introduced into the drum, a substantial very adhesive, coating is obtained in spite of the fact that they are only exposed to the metallic spray in a more or less haphazard fashion in the drum by the action of the stirring devices *f*.

The effectiveness of the novel process can be further enhanced if the air, by which the metallic liquid or vapor fed to the spraying apparatus for the purpose of atomizing the said liquid or vapor, is also preheated. This may be accomplished by a heating coil *w* arranged inside chamber near one of its walls. The cold compressed air is introduced into the coil at its one end *w'*, and after it has been heated in the coil *w* it passes out at the other end w^2, whence it is conducted to the spraying apparatus or pistol.

I claim:—

1. A device for producing metallic coatings comprising a chamber with a plating compartment and a preheating compartment above the plating compartment, two perforated hinged plates between the said compartments, means for tilting the said plates down from a horizontal position in which they form a support for the objects to be plated into oblique positions, and a rotatable drum arranged in the plating compartment and adapted to receive the said objects.

2. A device for producing metallic coatings comprising a chamber with a plating compartment and a preheating compartment above the plating compartment, two perforated hinged plates between the said compartments, means for tilting the said plates down from a horizontal position in which they form a support for the objects to be plated into oblique positions, a rotatable drum arranged in the plating compartment and adapted to receive the said objects, spraying devices for squirting atomized metal through the said apparatus into the drum, and a car beneath the drum for removing plated objects.

3. A device for producing metallic coatings comprising, a chamber with a plating compartment and a preheating compartment above the plating compartment, two perforated hinged plates between the said compartments, means for tilting the said plates down from a horizontal position in which they form a support for the objects to be plated into oblique positions, a rotatable drum arranged in the plating compartment and adapted to receive the said objects, spraying devices for squirting atomized metal through the said apparatus into the drum, a heating coil in the chamber for heating compressed air for the said spraying devices, and means for oscillating the spraying devices.

4. A device for producing metallic coatings comprising, a chamber with a plating compartment and a preheating compartment above the plating compartment, two perforated hinged plates between the said compartments, means for tilting the said plates down from a horizontal position in which they form a support for the objects to be plated into oblique positions, a rotatable drum arranged in the plating compartment and adapted to receive the said objects, spraying devices for squirting atomized metal through the said apparatus into the drum, a heating coil in the chamber for heating compressed air for the said spraying devices, and means for oscillating the spraying devices, and a car beneath the drum for removing the plated objects from the chamber.

5. A device for producing metallic coatings comprising, a chamber with a plating compartment and a preheating compartment above the plating compartment, two perforated hinged plates between the said compartments, means for tilting the said plates down from a horizontal position in which they form a support for the objects to be plated into oblique positions, a rotatable drum arranged in the plating compartment and adapted to receive the said objects, spraying devices for squirting atomized metal through the said apparatus into the drum, a heating coil in the chamber for heating compressed air for the said spraying devices, means for oscillating the spraying devices, a car beneath the drum for removing the plated objects from the chamber, and a hinged car-supporting track for inclining the said car.

In testimony whereof I have hereunto subscribed my name.

NIKOLAUS MEURER.