Apr. 24, 1923.

1,453,022

W. D. PHILIPS

MAGNETIC DRYING APPARATUS

Filed April 27, 1920

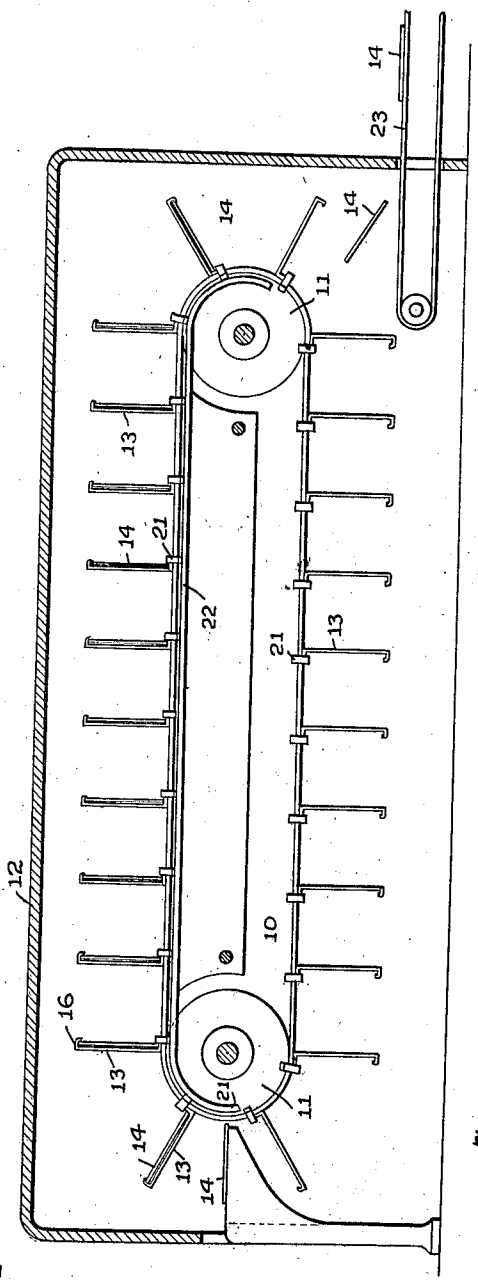


Fig. 1

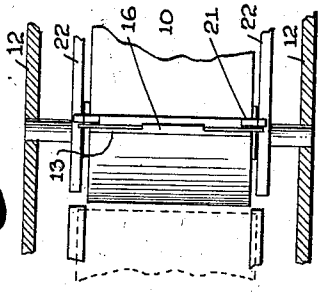


Fig. 2

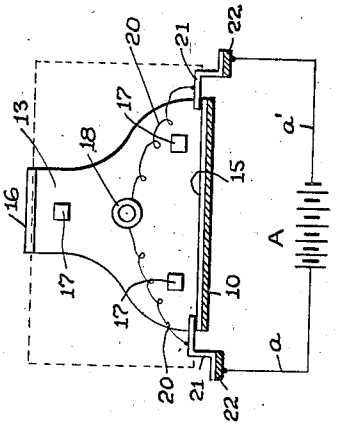


Fig. 3

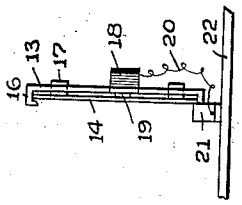


Fig. 4

William D. Philips. Inventor

By his Attorney.

W. P. Hutchinson.

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UNITED STATES PATENT OFFICE.

WILLIAM D. PHILIPS, OF BROOKLYN, NEW YORK.

MAGNETIC DRYING APPARATUS.

Application filed April 27, 1920. Serial No. 377,133.

To all whom it may concern:

Be it known that I, WILLIAM D. PHILIPS, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented a new and useful Improvement in Magnetic Drying Apparatus, of which the following is a full, clear, and exact description.

My invention relates to improvements in that form of drying apparatus which is adapted for use in drying metal plates or the like, and it is more particularly adapted to drying plates which have been coated with a varnish or other materials, and which have to be dried and handled with care to avoid marring the coated surface. In carriers and driers of this kind it is necessary to hold the plates separated from each other and edgewise of the carrier, in order that the surface which has been coated with varnish, paint, or other material, may not be injured, and with the ordinary apparatus for doing this work it is very difficult to hold the plates in place. Furthermore, in case of accidental displacement the plate is destroyed and other plates are likely to be injured and displaced. My invention relates to an improved magnetic means which lends itself to simple and efficient construction, and by which the individual plates are magnetically held in position as they are carried through the drying oven, and automatically released from magnetic control in order that they may be conveniently discharged. The particular form of carrier and of oven is not important, but it is necessary in carrying out my invention to have arms extending at an angle to the carrier, against which arms the individual plates lie, and on which are magnetic means for holding the individual plates. This will be better understood from the description which follows.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a sectional elevation of a form of carrier and oven showing my improvements.

Figure 2 is a broken detail sectional plan of an end portion of the same.

Figure 3 is a cross section showing the electric circuit, and

Figure 4 is a detail edge view of one of the carrier arms and showing means of magnetizing.

In carrying out my idea, a carrier 10 is used which is preferably of the endless variety, and which shows a belt running over suitable pulleys 11, but the construction of the carrier is unimportant, and it can be made of any length necessary or desirable. The carrier is enclosed in a suitable housing or oven 12 which can be heated in any preferred way, and which can be of any appropriate type without affecting the invention. It will be understood that the drawings are more or less diagrammatic, and are shown by way of example merely to illustrate how my invention can be carried into practical use.

The carrier is provided with arms 13 which can be made of sheet metal if desired, and are spaced apart, extending as illustrated at right angles to the carrier to which they are securely attached. These arms are adapted to carry sheet metal plates 14 which have been coated and can be fed to the arms of the carrier in any suitable way, as for instance in the manner shown at the left hand in Figure 1, where they are picked up successively by the arms as they pass from the under to the upper side of the carrier. The arms can conveniently be provided with base flanges 15 to facilitate their attachment to the carrier, and they are preferably at the outer ends each provided with a lip 16 which overhangs the plate 14 and assists in preventing its accidental displacement. There is space enough between the lips 16 and the inner ends of the arms to permit the plates 14 to lie easily and rather loosely so that the plates can be easily fed to the arms, and the lips simply assist in retaining the metal plates so that they will not be so readily shifted edgewise, or twisted edgewise. In other words, the lips have a steadying effect on the metal plates, but do not prevent them from being fed readily onto the arms as shown at the left in Figure 1, or from being discharged by gravity as shown at the right in Figure 1.

The plates 14 are adapted to rest against pole pieces 17 which are held in each of the arms, three being shown (see Figure 3)

spaced apart, two near the bottom and one near the top, but obviously there can be any desired number of these. They project slightly from each face of the arm, and each arm has also a solenoid magnet 18 arranged therein, the core 19 of which projects to about the same plane as the pole pieces 17 so that when a plate 14 is in position leaning against the arm, it will contact with the pole pieces 17 and core 19, and the current will pass from the solenoid through the plate and pole pieces and thus hold the plate in place by magnet attraction.

The solenoid can be energized in any convenient way, but it should be by interrupted means so that the arms 13 will not be magnetized at the time the plates 14 are discharged. As a convenient means of energizing the solenoid I have shown it connected by wires 20 with shoes 21 which can be made flexible if desired, and which are attached to the flange 15 of each arm at opposite sides of the carrier, the shoes running on rails 22 which extend along the sides of the carrier near the upper member thereof, and these are arranged in an electric circuit including the battery A and the wires a and a^1. Thus it will be seen that as the carrier moves, the arms will be successively energized as they assume an upright position, so that they will mechanically hold the plates 14 in place, and as the circuit is broken at the discharge end of the carrier, the plates can be easily deposited. The arrangement for feeding or removing the plates is not material, and I have shown them as being discharged upon a conveyor 23 which will carry them out of the drier as fast as they are deposited thereon. It will be seen that the rails 22 end near the point of discharge so that the current through a particular solenoid will be cut off to permit the dropping of a plate.

As stated, the drawings are more or less diagrammatic, but they show the essential thing which is the arms for holding the plates edgewise on the carrier, and for holding the plates magnetically while they are being dried and until discharged. Obviously the structure can be departed from widely without affecting the invention.

As illustrated it will be noticed that when a magnet 18 is energized, the current will pass from the magnet, through a plate 14, the pole pieces 17, and the arms 16. The arrangement described is particularly adapted for use as a drier, but the conveyor or carrier with its magnetic attachments can be used generally for carrying metal plates or the like in spaced relation.

I claim:—

1. A magnetic drying apparatus comprising an enclosing casing, an endless carrier movable in the casing and provided with outwardly projecting spaced arms each adapted to carry a plate edgewise with relation to the carrier, means for magnetizing the arms so as to hold the plates against displacement, and means for substantially demagnetizing the arms at the discharge end of the carrier.

2. A magnetic drying apparatus comprising a carrier, means for carrying plates in spaced relation and edgewise on the carrier, and magnetic means for preventing the displacement of the plates.

3. A magnetic drying apparatus comprising an enclosed endless carrier, means for carrying metallic plates edgewise in spaced relation with their inner edges next the carrier, and magnetic means for preventing the displacement of the plates.

4. In a magnetic drying apparatus, a carrier, arms projecting from the carrier, means for steadying metal plates while held between and against the arms, and magnetic means on the arms for holding the several plates.

5. In a magnetic drying apparatus, a carrier having arms projecting therefrom at an angle to the carrier, means for steadying plates against the arms, and means for magnetizing the arms.

6. In a magnetic drying apparatus, a carrier, metallic arms projecting from the carrier, means for steadying metallic plates while held edgewise on the carrier and flatwise against the arms, and magnetic means on the arms to prevent the displacement of the plates.

7. In a drier of the kind described, a carrier, metallic arms projecting from the carrier at an angle thereto, means for magnetizing the arms during a portion of their travel, and means for steadying plates while held against the arms and edgewie to the carrier.

8. In a drying apparatus a carrier, metallic arms projecting from the carrier at an angle thereto, a magnet on each arm, means for energizing the magnet, and means for steadying a plate against each arm.

9. In a drying apparatus, a carrier, metallic arms projecting from the carrier at an angle thereto, each arm being provided with a magnet and with spaced pole pieces against which a metal plate may rest, and means for energizing the magnet.

10. In a drying apparatus, a carrier, arms projecting from the carrier, the arms having flanges spaced apart from the carrier whereby a plate can be held against each arm and abut with the said flange, and means for magnetizing the several arms.

11. In a drying apparatus a carrier, arms projecting from the carrier, each arm being provided with pole pieces and a magnet whereby the individual plates to be dried may rest against the pole pieces and magnet, and means for energizing the magnets

during a portion of their travel with the arms.

12. In a drying apparatus, a carrier, metallic arms projecting from the carrier against which the plates to be dried may rest with their inner edges next to the carrier, electric conductors arranged parallel with the carrier, and means for magnetizing the arms from the said conductors.

13. In a drying apparatus, a carrier, metallic arms projecting from the carrier, said arms being provided with magnets and pole pieces against which the plates to be dried may rest with their inner edges next to the carrier, conductor rails alongside the carrier, said rails being included in an electric circuit, and shoes connected with the arms and adapted to contact with said rails.

14. The herein described means for conveying metal plates, comprising a carrier having arms projecting therefrom, means for steadying metal plates while held between and against the arms, means for magnetizing the arms thereby holding the several plates in place, and means for substantially demagnetizing the arms at the time that the plates are discharged.

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Witnesses:
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