Dec. 23, 1941. J. A. CLAFFY 2,267,190

PLATING MACHINERY

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Fig. 1.

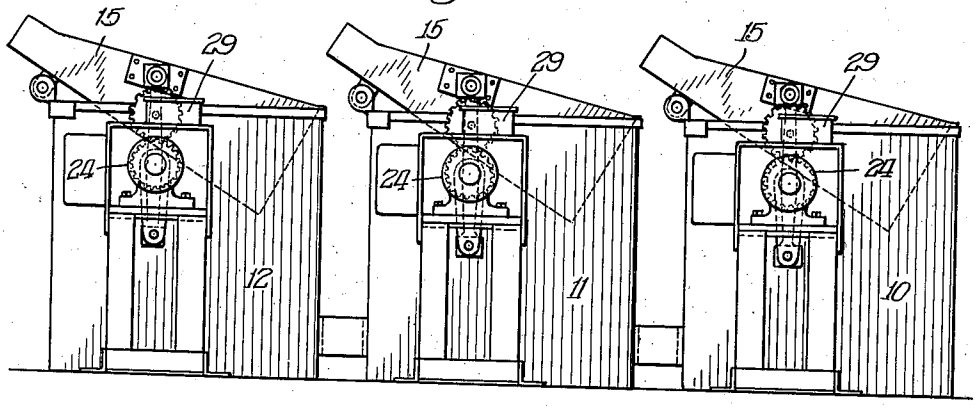
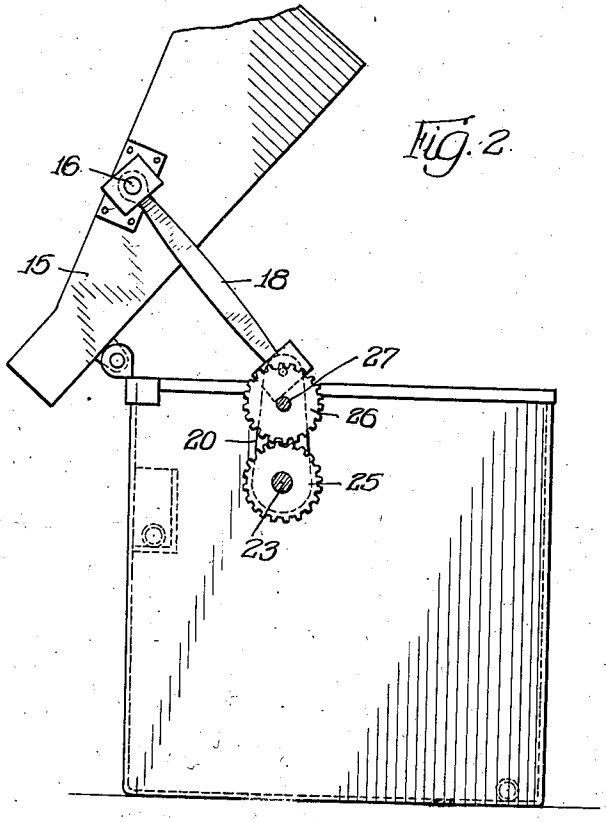


Fig. 2.



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PLATING MACHINERY

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Fig. 3.

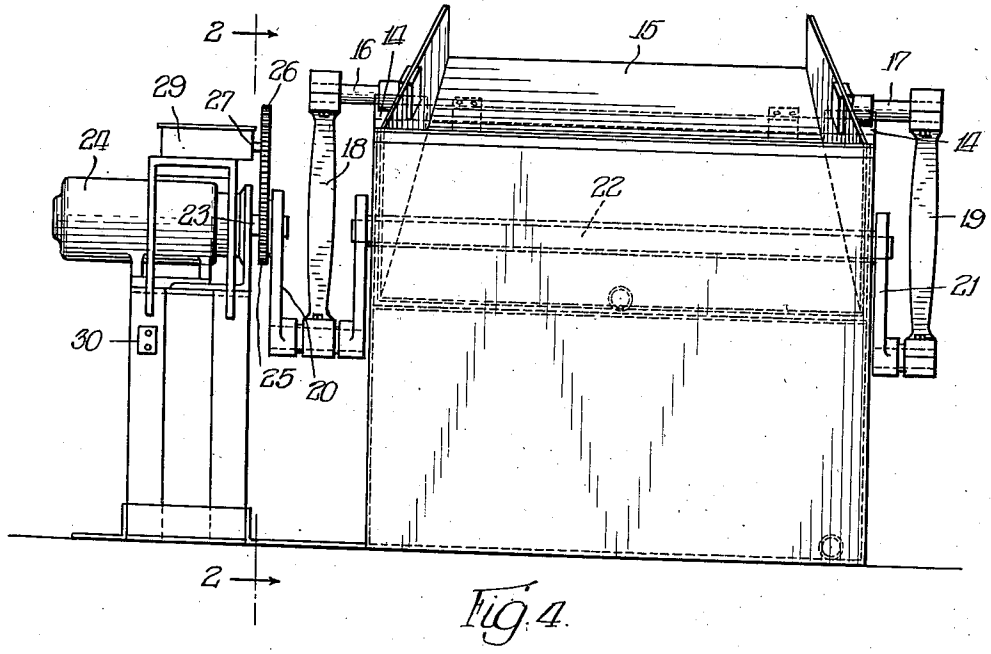

Fig. 4.

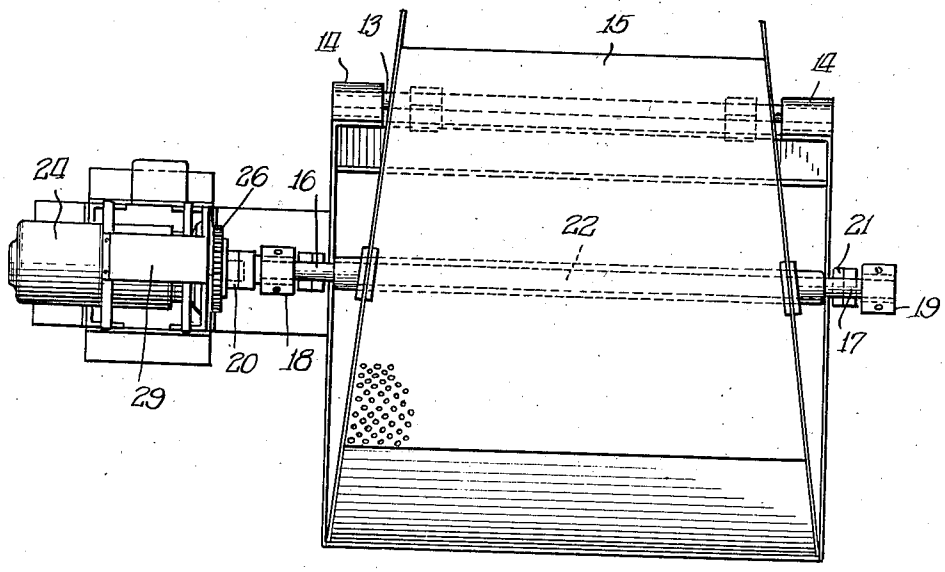

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Fig. 7.

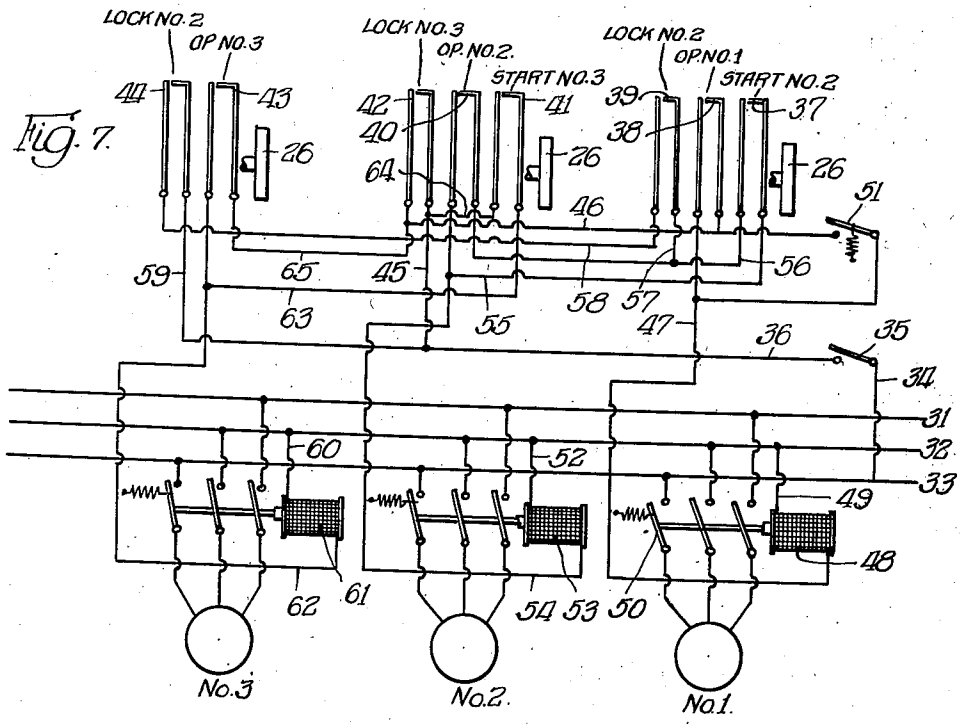


Fig. 5.

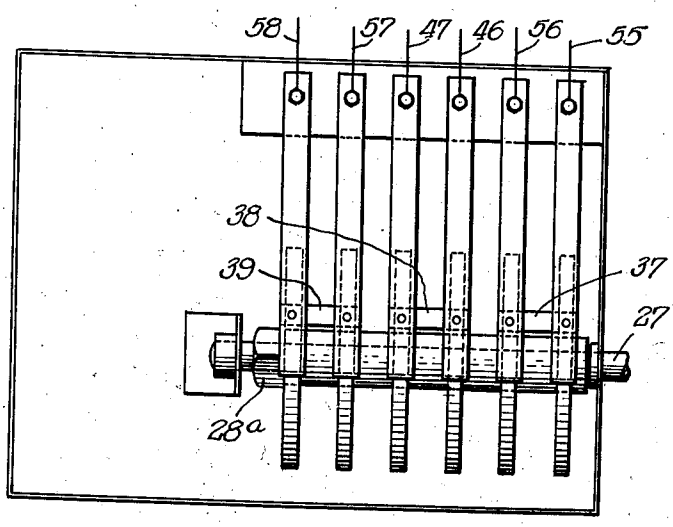
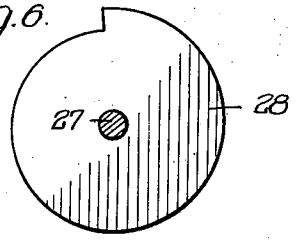


Fig. 6.



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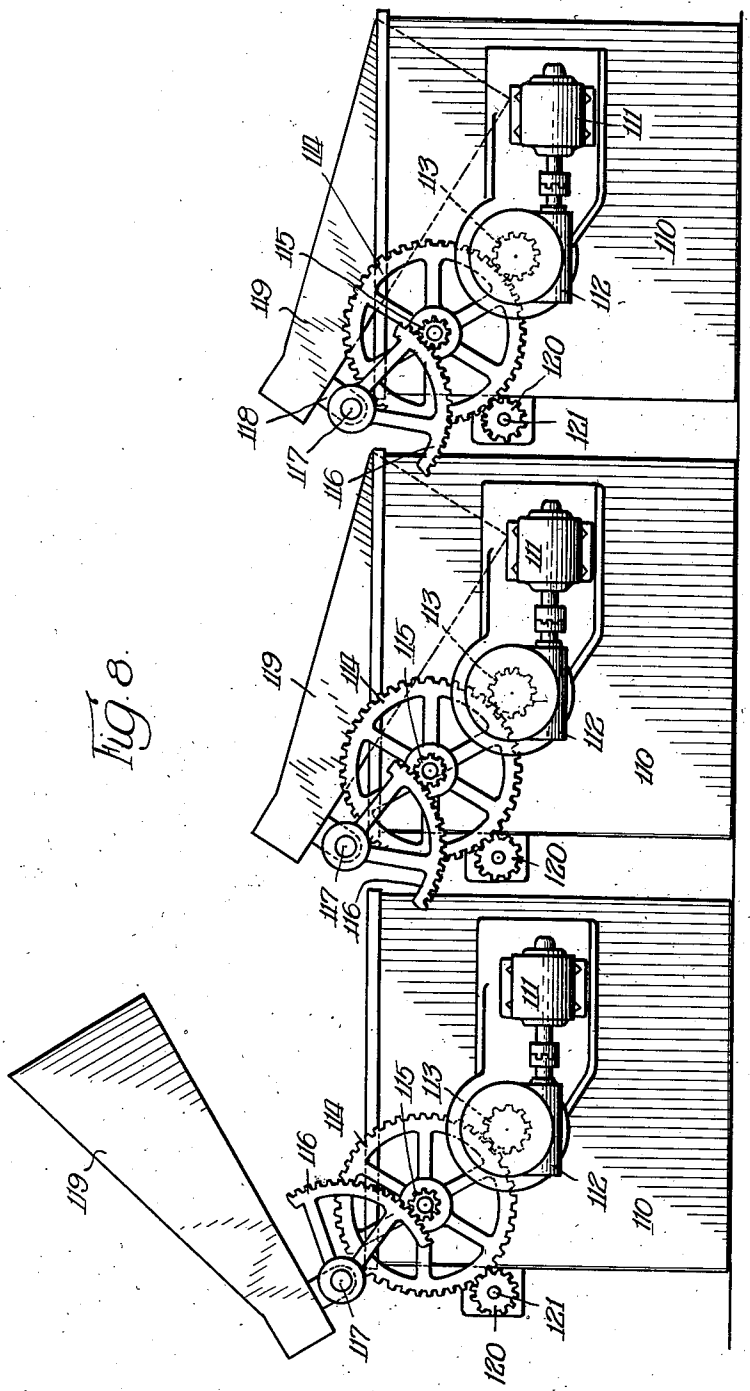

Fig. 8.

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Patented Dec. 23, 1941

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UNITED STATES PATENT OFFICE

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PLATING MACHINERY

Joseph A. Claffy, Wheaton, Ill., assignor to Mercil Plating Equipment Company, Chicago, Ill., a corporation of Illinois

Application March 27, 1940, Serial No. 326,165

4 Claims. (Cl. 214—17)

My invention relates to plating equipment and particularly to a novel means adapted for use in treatment of the plated articles subsequent to plating.

In the plating of small articles it is customary to carry on the operations in bulk within a barrel or cylinder and the operations subsequent to that of plating must be performed in separate tanks, the material being treated in bulk. If the transference from one tank to another is done manually, it is rather laborious and slow and the invention here disclosed has to do with the construction of automatic means whereby the successive operations are carried on without the attention from a workman. This insures, in addition to the saving of labor, a correct timing for the successive treatments. To that end I provide a series of tanks within which a movable container in the form of a hopper is mounted, the hopper being so arranged that by the operation of a motor it may be lifted from the tank and tilted to discharge its contents into the next successive tank.

Apparatus of two different forms adapted for operation in the described manner is illustrated in the accompanying drawings; in which,

Fig. 1 is an end elevation of a series of three tanks adapted for co-action through a suitable timing switch;

Fig. 2 is a similar view showing one of the hoppers in tilted or discharge position;

Fig. 3 is a side view of one of the hoppers shown in Fig. 1;

Fig. 4 is a plan view of one of the units;

Fig. 5 is a plan view of the timing switch;

Fig. 6 is a detail view of one of the timing cams;

Fig. 7 is a wiring diagram; and,

Fig. 8 is a view similar to Fig. 1 showing a different form of hopper operating means.

As shown in Figs. 1 and 3 I provide in this instance three conventional treatment tanks 10, 11, 12, the first being intended to contain water for washing, the second to contain an acid solution and the third to contain water. If desired, other tanks may be added.

Since each of the three units is a duplicate of the other, a description will be given of but one thereof. Mounted within the tank on a shaft 13 carried in brackets 14, at its ends is a hopper 15 constructed of perforated steel or non-corrosive metal, the perforations enabling the escape of the liquid within which the lower end of the hopper is immersed. As will be seen, the side walls of the hopper are preferably of increasing height from the pivot end to the free end, thus providing ample capacity for bulk materials. Inasmuch as the hopper is permitted to tilt downward, the materials within the hopper will be fully immersed in the liquid within the tank.

The means for effecting oscillation of the hopper are best shown in Fig. 3 comprising suitable stub shafts 16—17 mounted on the sides near the middel of the hopper, the shafts having a rotatable connection with connecting rods 18—19 respectively connected to cranks 20—21. The cranks are connected to each other through the tank by means of the shaft 22 which extends transversely through and across the tank at a median point in the length of the tank. Thus the hopper is lifted from both sides to avoid unequal strains.

The crank 20 is keyed to a shaft 23 which constitutes the drive shaft of the electric motor 24 through suitable reduction gears within the motor housing. The motor is carried on a stand arranged alongside of the tank.

Also mounted on the shaft 23 is a gear 25 which meshes with a similar gear 26 carried on a shaft 27 which in turn carries the timing cams 28, best shown in Figs. 5 and 6. These are contained within the box 29. A starting switch is indicated at 30.

It will be seen that for each cycle, involving 360° of movement of the crank 20, the hopper is raised to the position of Fig. 2 and then returned to the position of rest shown in Fig. 1. In the position of rest, the shaft 22 may act as a bottom limit stop for the hopper. However, in such position of rest the cranks 20—21 will be vertically in line with the connecting rod 18—19 in position to carry the load of the hopper and contents without the necessity for a motor brake.

The timed motor operation is effected by reason of the timing switch shown in Figs. 5 and 6, and the wiring diagram illustrated in Fig. 7, which will now be described.

Current is supplied through the lines 31—32—33, a branch line 34 having a switch 35 therein. The line 36 extending from the switch serves to furnish current for the timing switches, one being provided for each unit, and one of which, for unit No. 1, is shown in Figs. 5 and 6. In the switches controlling the number 1 motor for actuating the first hopper, the three switches are numbered 37—38—39. The three switches for the second unit are numbered 40—41—42, while the two switches for the third motor unit are numbered 43 and 44. It will be understood that the switches for the second and third units are

not illustrated, but are duplicates of that illustrated in Fig. 5.

Current from the line **36** passes through the branch **45** through the switch **42**, which is assumed to be closed, thence through line **46** to switch **38**, which is likewise assumed to be closed, thence through line **47** to the magnetic switch **48**, thence through line **49** to the line wire **32**. The energizing of the magnetic switch serves to close the three pole switch **50** and to connect the line wires to the three-phase motor of the No. 1 unit.

If the position of the timing switch is such that switch **38** is not closed at the start of operations, the pressure switch **51** may be momentarily depressed to complete the described circuit. As the motor starts and the hopper is raised, the timing-switch-cams are rotated through the shaft **27** and before the cycle of the number 1 unit is completed, the cam will close switch **37** whereby current will flow from the line **32** through branch **52**, magnetic switch **53**, wire **54** to branch wire **55**, thence through the switch **37**, wire **56**, branch **57** then through closed switch **39** and wire **58** to switch **44**, which is likewise closed, and back through wire **59** to wire **36**. If the position of unit No. 3 is such that switch **44** has not been closed, then unit No. 2 will not start.

At a point just prior to the completion of the cycle of unit No. 2, current from line **32** passes through branch wire **60** to the magnetic switch **61**, then through wire **62** to a branch **63**, thence through a switch **41**, branch **64**, thence through wire **45** to wire **36**. When, however, the motor of unit 3 has been started, switch **43** will be closed as switch **41** is opened, and switch **42** closed when current will then flow from wire **62** through switch **43**, then by wire **65** through switch **42** and out through wire **45** to wire **36**.

Inasmuch as the cams **28** are adjustable on the shaft through the medium of the adjusting nut **28***a*, the timing may be changed as required. For example, No. 1 hopper may be again actuated before No. 3 has completed its cycle.

In the modified form shown in Fig. 8 the tanks remain the same, this being likewise true of the hoppers.

In the construction of Fig. 8 the tanks, hoppers and operating means are each a duplicate of the other. In such construction the tank **110** supports on its side the electric motor **111**, the shaft of which extends into a reduction gear box **112**. A pinion **113** outside of the gear box engages a gear **114**, a pinion **115** at the center of which cooperates with a quadrant **116**, keyed to a shaft **117** which is in turn keyed to the bracket **118** joined to the forward end of the hopper **119**.

By means of a gear **120** engaging the gear **114** and the shaft **121**, a limit switch, not shown, may be operated.

The shaft **117** is keyed to the brackets **112** fixed to one end of the hopper **123**, whereby the hoppers may be lifted as indicated at the left hand end of Fig. 8.

In the operation of an arrangement such as shown in Fig. 8, it is necessary to employ reversing motors, and suitable switches and wiring will be provided therefor. Since the specific wiring forms no part of this invention, the diagram has not been illustrated.

It will be understood that while I have illustrated three units and the wiring diagram for said three units, a greater or less number may be provided by simple changes in the wiring.

I claim:

1. In plating apparatus, the combination of a tank, a perforated hopper pivoted for oscillation at an upper side edge of the tank, a shaft extending through the tank at a median point in the length of the tank, cranks connected to the ends of the shaft outside of the tank and connecting rods from the hopper to the cranks, a stand alongside of the tank, and a motor mounted on the stand for operating said cranks.

2. In plating apparatus, the combination of a tank, a perforated hopper pivoted for oscillation at an upper side edge of the tank, a shaft extending through the tank at a median point in the length of the tank, cranks connected to the ends of the shaft outside of the tank and connecting rods from the hopper to the cranks, a stand alongside of the tank, a motor mounted on the stand, and reducing gears connecting the motor to one of said cranks.

3. In plating apparatus, the combination of a tank, a perforated hopper pivoted for oscillation at an upper side edge of the tank, a shaft extending transversely through the tank at a point below the lower limit of movement of the hopper in the tank, cranks on the ends of the shaft outside of the tanks, connecting rods between the hopper and the cranks, and a unitary motor and speed reducing means mounted immediately adjacent to the side of the tank and connected to one of said cranks.

4. In plating apparatus, the combination of a tank, a perforated hopper pivoted for oscillation at an upper side edge of the tank, a shaft extending transversely through the tank at a point below the lower limit of movement of the hopper in the tank, cranks on the ends of the shaft outside of the tanks, connecting rods between the hopper and the cranks, a unitary motor and speed reducing means mounted immediately adjacent to the side of the tank and connected to one of said cranks, and timing means operated by said motor for correlating said hopper to other hoppers in a series.

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