Feb. 3, 1925. 1,525,075

C. H. HILL

STRIPPING MACHINE

Original Filed Oct. 28. 1919 4 Sheets-Sheet 1

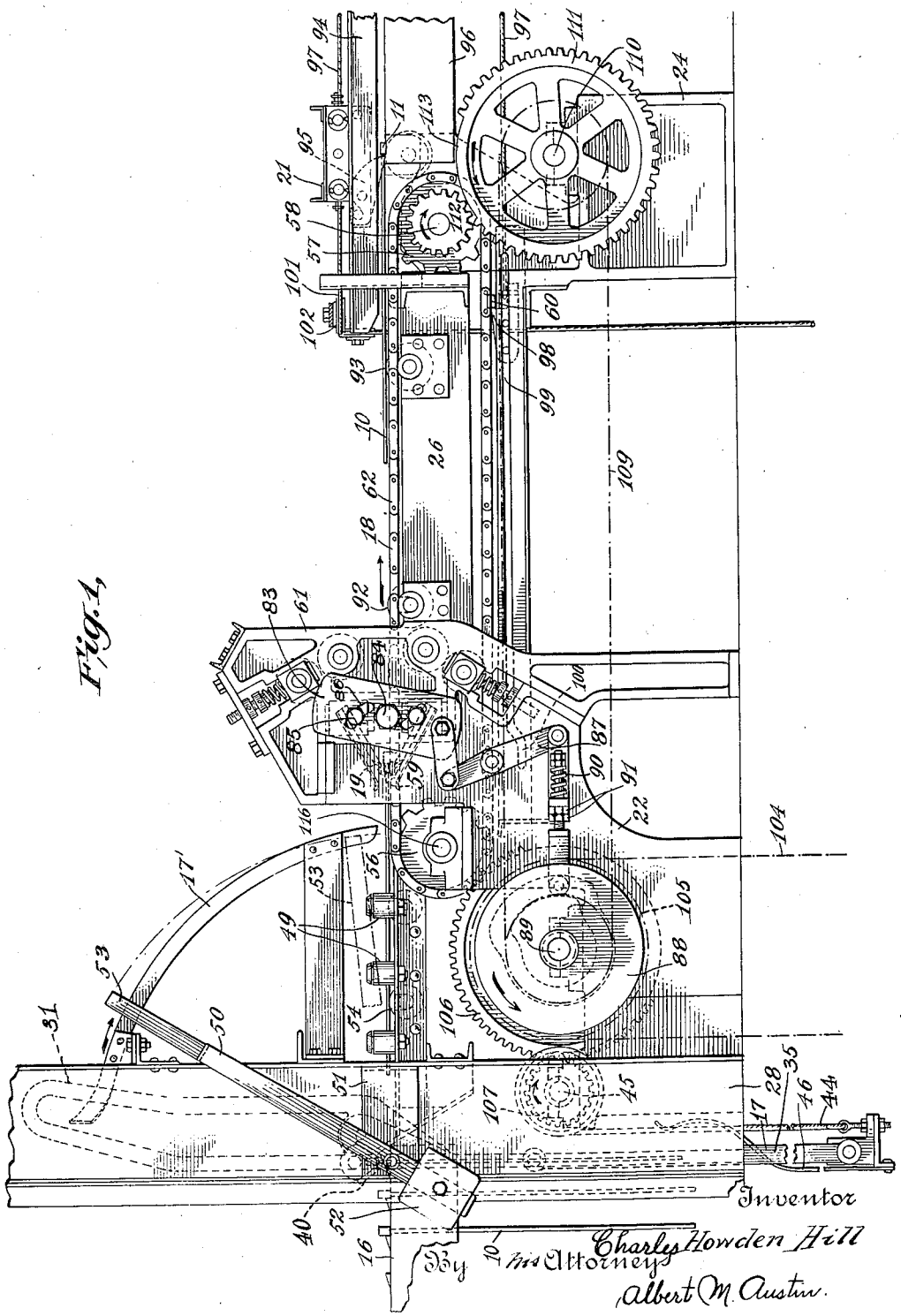


Fig. 1.

Inventor
Charles Howden Hill
By his Attorneys
Albert M. Austin.

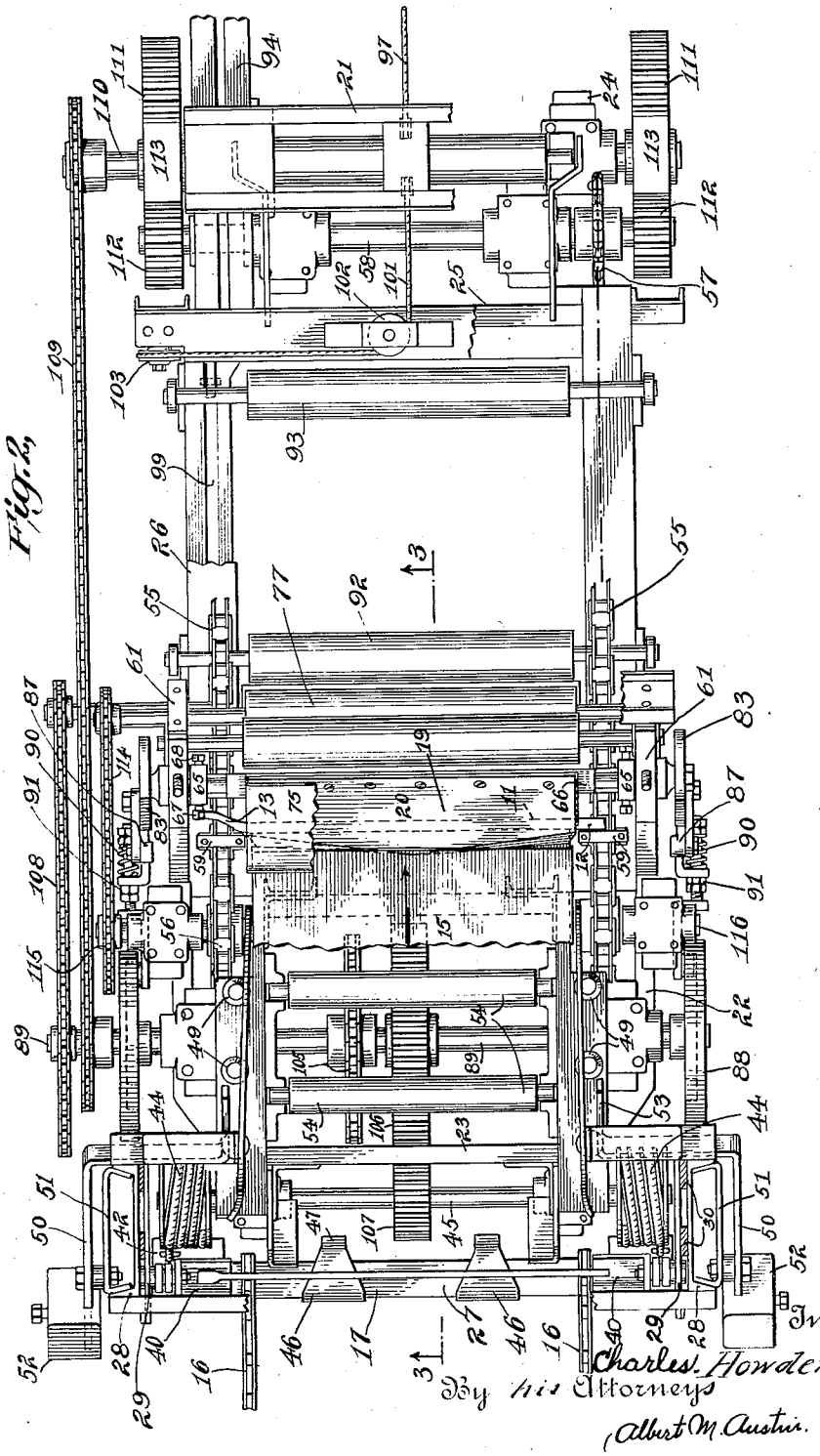
Feb. 3, 1925. 1,525,075

C. H. HILL

STRIPPING MACHINE

Original Filed Oct. 28. 1919 4 Sheets-Sheet 2

Fig. 2.



Inventor
Charles Howden Hill
By his Attorneys
Albert M. Austin.

Feb. 3, 1925. 1,525,075

C. H. HILL

STRIPPING MACHINE

Original Filed Oct. 28. 1919 4 Sheets-Sheet 3

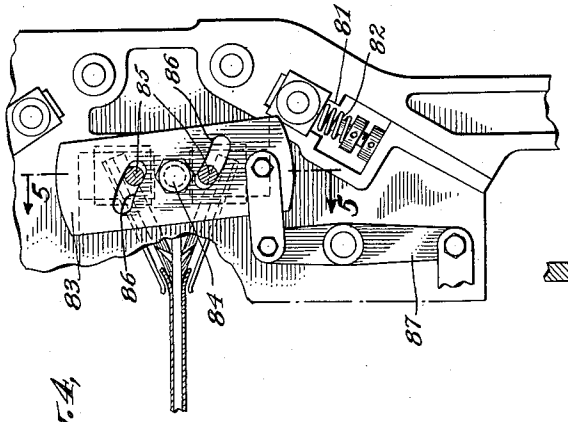


Fig. 4.

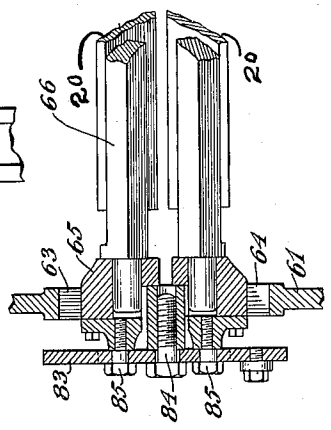


Fig. 5.

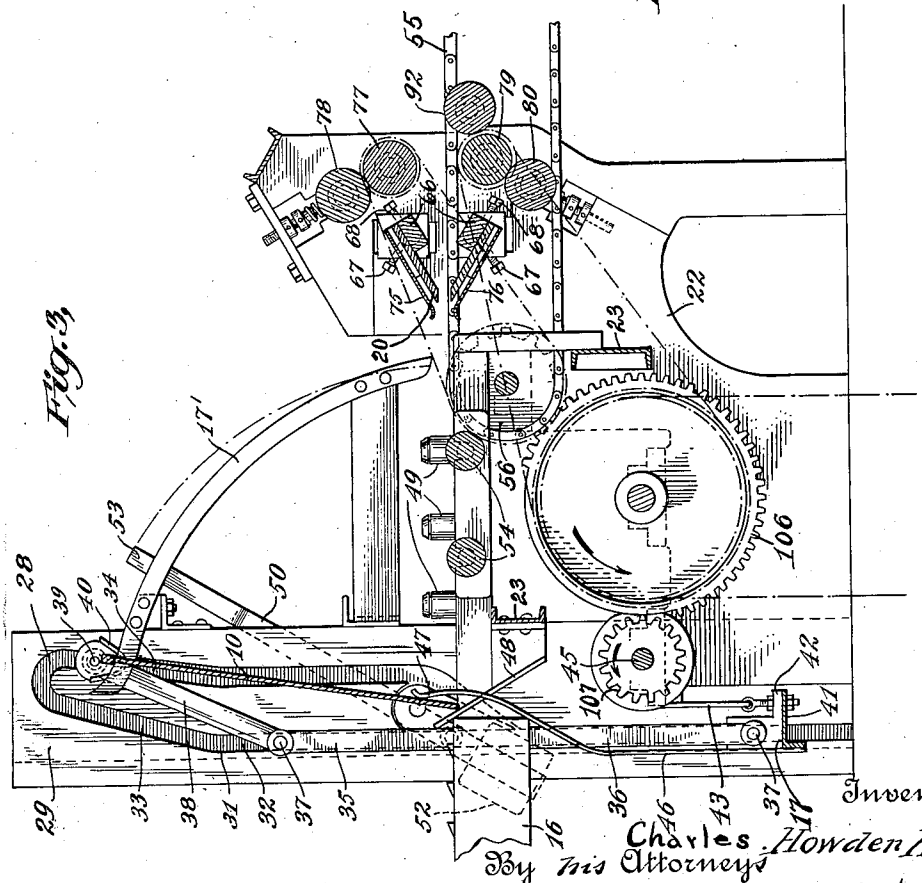


Fig. 3.

Inventor
Charles Howden Hill
By his Attorneys
Albert M. Austin.

Feb. 3, 1925. 1,525,075

C. H. HILL

STRIPPING MACHINE

Original Filed Oct. 28. 1919 4 Sheets-Sheet 4

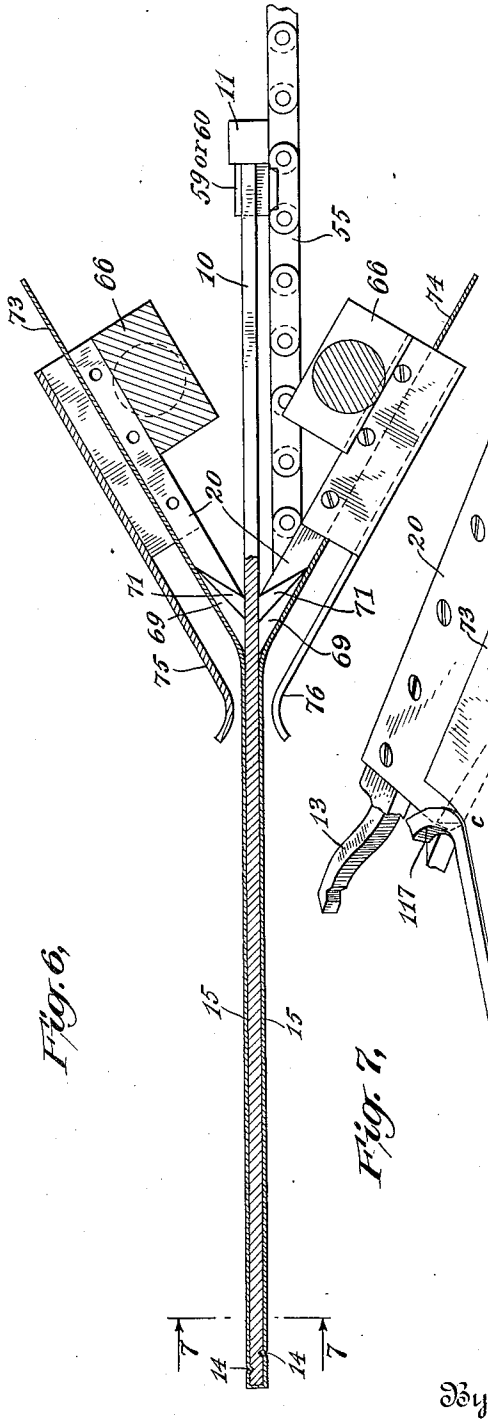


Fig. 6.

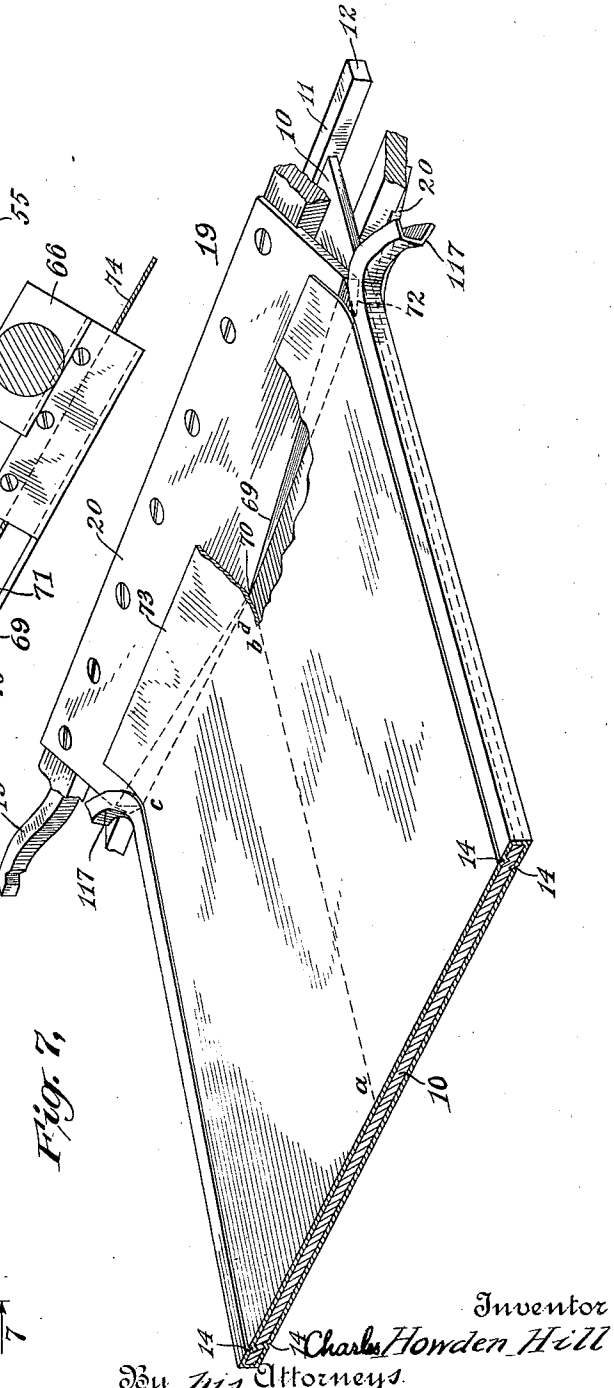


Fig. 7.

Inventor
Charles Howden Hill
By his Attorneys
Albert M. Austin.

Patented Feb. 3, 1925. 1,525,075

UNITED STATES PATENT OFFICE.

CHARLES HOWDEN HILL, OF PERTH AMBOY, NEW JERSEY, ASSIGNOR TO UNITED STATES METALS REFINING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

STRIPPING MACHINE.

Application filed October 28, 1919, Serial No. 334,029. Renewed January 25, 1923.

To all whom it may concern:

Be it known that I, CHARLES HOWDEN HILL, a citizen of the United States, and resident of Perth Amboy, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Stripping Machines, of which the following is a specification.

The invention relates in general to an improvement in the art of forming starting sheets in certain electrolytic deposit forming processes and in other similar metallurgical processes. Specifically, the invention relates to an improved method of stripping the metallic coatings from cathode plates and the invention further relates to certain improved instrumentalities for practicing the method.

In this art, as at present practiced, it is usual in preparing starting plates for the electrolytic vat, such for instance as the well known thin copper plates, to form a coating of about one-eighth of an inch on a flat copper cathode plate of a certain configuration hereinafter more fully described; to remove the plate from the vat and by a chiselling operation more or less successfully separate this thin copper plate from opposite sides of the cathode plate. This manual chiselling of the coatings from the supporting plate is obviously cumbersome, expensive and develops irregularities in the removed plate or sheets. These irregularities have a tendency to develop warpage in the succeeding hot electrolytic operations to which they are subjected resulting in the formation of short circuits between the plates and other objectionable factors which renders this old system almost commercially impossible.

One of the primary objects of this invention is to separate the sheet coatings from the cathode plates economically and mechanically and incidentally to form the resulting starting sheet with characteristics having peculiar advantages in the succeeding electrolytic treatment.

Another object of the invention is to provide a mode of removing the coatings from the cathode plate in such a way that there will be formed the maximum possible size of flat starting sheet or plate and by means of which mode of removal from the cathode plate the scrap metal will be separated from the formed plate in the single operation of forming the plate.

Broadly, these objects are attained by providing a particular form of grooved cathode plate and, by means of suitable knives engaging the coated plate, the coatings on opposite sides of the cathode plate are stripped therefrom by progressive movement of the cutting knife edges from end to end of the plate while disposed across the lines of the grooves formed in the plate.

Referring particularly to the mechanical aspect of the invention, one of the primary objects is to provide a simple, and yet powerful mechanism which will economically dispose the coated cathode plates in position so as to be engaged by the stripping knives, passed thereby while engaged by the knives and discharged from the machine in proper timed relation to secure the necessary coaction of movable parts hereinafter more definitely defined and described.

Still another object of the invention is to provide a machine of the character outlined which will be entirely automatic in its action; which will be self-responsive to accommodate itself to the variation in the commercially different plates passed therethrough and in which the plate and sheets stripped therefrom will be passed from the machine with the cathode plates immediately ready for re-use and with the removed metallic sheets ready to receive the suspending attachment usual in the succeeding operations.

Still another object of the invention is to provide for ready adjustments of certain parts so as to accommodate the machine to different characters of plates to be handled and at the same time to feature the perfect production of the resulting starting plates and the minimizing of the number of necessary parts in the machine.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings

and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

Referring to the accompanying drawings:—

Figure 1 is a view in side elevation showing a preferred embodiment of the mechanical feature of the invention and also illustrating an instrumentality for practicing the method features of the invention;

Figure 2 is a plan view looking down upon the device shown in Figure 1 with certain parts omitted and other parts broken away to disclose normally hidden parts;

Figure 3 is a longitudinal sectional view taken through the receiving end of the machine and taken on the line 3—3 of Figure 2 looking in the direction indicated by the arrows;

Figure 4 is an enlarged detailed view in side elevation of the stripping knife control parts of the device shown in Figure 1 and illustrating the initial engagement of the stripping device with the coats on the cathode plate;

Figure 5 is a vertical sectional view taken on the line 5—5 of Figure 4 and with certain parts omitted;

Figure 6 is an enlarged longitudinal sectional view taken through one of the cathode plates and showing the engagement therewith of the cutting knives when about one-third of the way along the plate; and

Figure 7 is a perspective view of the parts shown in Figure 6 with one end of the plate in section approximately on the line 7—7 of Figure 6 and with the knives not as far advanced as in the showing in Figure 6.

Referring particularly to the showing in Figures 6 and 7 for a description of the coated cathode plate it will be understood that the plates comprises a body portion 10, which in this specific disclosure is a rigid copper plate, having a supporting metal plate bar 11 defining its upper edge. It will be understood that this plate is of conventional construction and due to known requirements necessary to suspend the plates in the electrolytic tanks the bar is of greater thickness than the plate as shown in Figure 6, has a straight extension 12 from one end and a peculiarly upwardly and outwardly curved and notched extension 13 at the opposite end. Opposite sides of the plate are provided, adjacent each edge except the edge to which the plate bar is attached, with a V-shaped groove 14. When the cathode plates are removed from the electrolytic tank they are more or less uniformly coated with a thin sheet of metal 15, in this case a copper sheet which extends to within a couple of inches of the plate bar 11. It is this close positioning of the upper edge of the coating to the fixed plate bar 11 that necessitates a dwell in the movement of the plate through the machine for a period of time sufficient to permit the stripping knives to come into operation after the bar 11 has passed as is more fully hereinafter described. It is understood that the surface of the body portion 10 of the cathode plate is oiled before the copper deposit is formed thereon, thus forming a separating medium between the copper cathode plate and the copper coating. While this oil coating acts to reduce the adhesion between the coating and the plate it is nevertheless true that the coating adheres tenaciously to the plate and it is one of the features of this disclosure to provide apparatus having sufficient power to rip the coating from the plate and to have sufficient ruggedness to withstand the strain incidental to such an operation while insuring an even smooth operation.

For a general description of the operation of the machine it is to be understood that a series of the coated plates 10, vertically disposed and spaced apart by mechanism forming no part of this disclosure are fed by a step-by-step conveyor 16 into position to be engaged by an elevator 17 which picks up the plates and while holding the lower edges of each plate permits the upper edge to drop onto a guide segment 17′ which positions the plate on an endless conveyor 18. This conveyor engages each of the plates in succession as they are fed thereto, feeds them to a stripping mechanism 19; a dwell in the action of the conveyor is timed to permit the stripping mechanism to come in contact with the cathode plate in advance of the edge of the coating adjacent the bar 11; with the stripping knives in position, the conveyor continues its movement towards the discharge end of the machine drawing the cathode plates forcefully between the two knives 20 constituting the active tools of the stripping mechanism. The plates having been passed along by the conveyor are discharged from the machine by a discharging carriage mechanism 21 operatively associated with the conveyor so as to be driven thereby in timed relation to pick up each succeeding plate as it is discharged from the conveyor.

Referring to the details of the structural parts of the machine, there is disclosed at the receiving end two castings 22 constituting side frames fastened together by girders 23 to form a braced forward frame. Two other side frames 24 are similarly connected by girders 25 to form a rear frame. The forward and rear frames are rigidly connected by transversely spaced apart

longitudinally extending sills 26 constituting bearings for certain rollers and other parts hereinafter described.

The machine is substantially symmetrical on opposite sides of the vertical longitudinal medial plane and in the following description it will be understood that parts referred to on one side of the machine have their corresponding part on the opposite side unless otherwise described.

Referring first to the left or receiving end of the machine it will be noted that an elevator supporting frame 27 is fastened to the forward end of the side frames 22 and coacts therewith to form a rigid massive structure at this end of the machine. The elevator frame includes a channel upright 28 on the inner face of which is positioned an upstanding face plate 29 spaced therefrom by filler strips 30. The face plate 29, as shown in Figure 3, is provided with an elevator guiding slot 31 extending therethrough. This slot includes a main upright portion 32 which is inclined forwardly as shown at 33; is then curved sharply back upon itself and then depends downwardly and slightly rearwardly to form a forwardly disposed portion 34. The lower end of this forward portion inclines rearwardly and enters the same upstanding portion 32 at a point about half way up the elevator frame. The elevator 17 includes at opposite sides a linked arm 35 which is formed of the two links, a lower relatively long link 36 confined to the main slot 32 by end rollers 37 and an upper relatively short rocking link 38 having a roller 39 at its upper end capable of moving through the portions of the slot designated by the characters 33 and 34. The upper end of each link 38 is defined by an open-top lift cup 40 in the form of a channel piece designed to engage the extensions 12 and 13 on opposite sides of the plate to lift the same off of the conveyor 16 and to raise the same past the dotted line position, shown in Figure 1, into the full line position shown in Figure 3. The lower end of the links 36 are connected by means of a transversely disposed L-piece 41, which is provided at opposite ends with castings forming forwardly extending lift members 42. To each of these castings is bolted one end of a flexible connection 43 passed about a drum 44 mounted on a transversely extending drum shaft 45 journalled in a rearward extension from the adjacent side frame 22. The elevator is raised periodically by the action of the shaft 45 and is then permitted to fall by gravity in time to receive the next plate advanced by the conveyor 16. The elevator is provided with a pair of transversely spaced apart, upstanding long spring stops 46, hereinafter identified as forward stops, the upper end 47 of which is free. These stops (as shown in Figure 3) are designed to engage the lower edges of the plates after they have advanced forwardly a short distance as the upper edges are raised and projected forwardly an overbalancing distance by the elevator. A pressing 48 extends upwardly and rearwardly from the side frame 22 (as shown in Figures 2 and 3) for engaging opposite sides of the lower edge of the plates, after the lower edges have been slightly advanced by the elevator. These pressings, hereinafter identified as rear stops, are designed to act on the plates to prevent any rearward movement of the same as it is permitted to fall from its vertically inclined into its horizontal position.

The guide segments 17′ are so positioned at opposite sides of the machine as to engage the extensions 12 and 13 as the plates are discharged from the elevator. These guide segments extend forwardly (as shown in Figures 1 and 3) and slightly inwardly (as shown in Figure 2) of the machine and are arranged to direct the plates into a horizontal position on the machine with the plate bars disposed in advance. The correct longitudinal position of the plate is insured by parallel lines of upstanding, longitudinally spaced apart guide rollers 49 carried by the side frames 22.

For the purpose of easing the plates in their lowering movement onto the bed of the machine, a pair of counterweighted and forwardly inclined arms 50 are fulcrumed to straps 51 positioned in the channel of the uprights 28. The lower end of each arm 50 is provided with an adjustable counterweight 52 and the upper end is inturned to form a Z-extension 53 with its free end disposed in advance respectively of the extensions 12 and 13 in their downward movement onto the machine as indicated by the dot and dash lines in Figures 1 and 3. The plates are received on horizontally disposed and transversely extending rollers 54 arranged to support the plates in their horizontal movement through the machine.

The endless conveyor 18 is formed of a pair of longitudinally extending chains 55 at opposite sides of the machine, which are passed over idler sprockets 56 at the receiving end thereof and over driven sprockets 57 mounted upon a conveyor driving shaft 58 at the discharging end of the machine. The idler gears 56 are so disposed with reference to the lower ends of the guide segments that the plate bar 11 is positioned so as to be engaged by one of a pair of lugs 59 or 60 equally spaced apart on each of the chains 55.

The stripping mechanism 19 is disposed slightly in rear of the receiving end of the conveyor 18 and is positioned at opposite sides in upstanding extensions 61 raising above the level of the bed of the machine

from the side frames 22. The extensions 61 are each slotted on opposite sides of the path of movement of the plate defined by the upper reach 62 of the conveyor 18. The slots herein designed as an upper slot 63 and a lower slot 64 (see Figure 5) and are vertically disposed and provide journal way for the knife carrying guide blocks 65. These guide blocks constitute journals for knife-backing bars 66 constituting the supports for the knives 20, as shown more particularly in Figure 5. The blocks are set in vertically adjusted position by set screws 67 and 68. The knives are oppositely disposed relative to each other, as shown in Figure 6, forwardly inclined in a direction opposite to the direction of movement of the plates through the stripping mechanism and extend transversely of the line of movement of the plates through the machine.

The knives are of peculiar construction as will be noted from Figures 6 and 7. The forward cutting edge 69 is inclined outwardly and rearwardly from a central point 70 and with the bevel 71 of the upper knife facing upwardly and opposite to the usual position of a bit in a plane and with the bevel of the lower knife inverted. By this form of knife it is possible to raise the coating on each side of the plate from end to end by simultaneously prying the same up on opposite sides of the longitudinal medial lines *a*—*d* which passes through the point 70. Each succeeding point in the cutting line, indicated by the dotted line *c*—*d* in Figure 7, considered in a direction towards the medial line *a*—*b*, is slightly in advance of the next adjacent outer point in the line *c*—*d*. Each extreme end of the cutting edge is sharply bevelled off as shown at 72 so as to prevent any possibility of a free edge of the knife cutting the coating sheet at any other point than along the lines desired and defined by the V-slots 14. By this cutting or rather stripping operation two sheets of metal, an upper sheet 73 and a lower sheet 74 are formed. The upper sheet 73 which is passed between the upper knife and a guide plate 75 and a lower sheet is passed between the lower knife and a lower guide plate 76. The upper sheets or plates passed between the knife and guide 75 are fed between and advanced by an upper pair of rollers 77 and 78 positioned above the path of movement of the plates. Similarly the lower stripped plates are advanced by a lower pair of rollers 79 and 80. The rollers 77 and 79 which are nearest the plane of movement of the plates are actively driven from the source of power by means hereinafter described. The coacting rollers 78 and 80 are each adjustably mounted in a guideway 81, the lower of which is shown in Figure 4. The coacting roller of each set is held in resilient and adjustable engagement with its active roller by a threaded bolt and spring connection 82 common in roller mountings of the type illustrated.

For the purpose of moving the knives to and from their operative engagement with the coated plates a rocking cam plate 83 is pivotally mounted on a pivot bolt 84 (shown in Figure 5) and bolts 85 are passed through arcuate slots 86 in the plate and engage with the vertical movable blocks 65. These slots are arched in such a direction that the swinging of the plates 83 in one direction will bring the knives simultaneously into engagement with the plate to remove the coating therefrom, as indicated in Figure 4 and the rocking of the plates in the opposite direction and into the position shown in Figure 1, will move the knives into spaced apart relation and into an inoperative position spaced from the plates a distance sufficient to permit the plate bar to be passed between the cutting edges of the knife without contact therewith. The rocking cam plate is actuated by a toggle link connection 87 controlled by a face plate 88 mounted on a main drive shaft 89. The link connection includes a connecting spring 90, the tension of which is adjustable through the rotation of the lock nuts 91 so as to vary the pressure of the knives on the cathode plate. The cam 88 is of the two-cycle type and is arranged to maintain the knives in engagement with the coated plate for a period of time necessary to remove the coating to be moved out of engagement with the stripped plate at the end of the operation on each sheet, and to be again restored into engagement with the next succeeding plate after the plate-bars have passed the cutting edges of the knives.

After the plate has passed through the stripping mechanism it is advanced by the conveyor 18 over suitable rollers 92 and 93 and to the discharge carriage 21. The carriage is positioned on tracks 94 lapping the discharge end of the conveyor, as shown more particularly in Figure 1 and designed to convey the plates to a position beyond that showing in the drawings. Opposite ends of the carriage are provided with downwardly hanging dogs 95 which are free to pass idly over the plate bars 11 to drop back of the plate bars and to engage the same in a left-to-right movement of the carriage. The stripped plates are thus removed from the conveyor as shown at the right of Figure 1 and advanced along a discharging frame 96. The carriage is advanced in its plate discharging movement by means of a flexible connection 97, which is passed about a pulley at the right of the frame 96, but not shown in this disclosure, and brought downwardly and forwardly and connected to a kick-up trigger 98 slidably mounted in a runaway 99 on one of

the connecting plates 26, as shown in Figure 2. The trigger is disposed in the path of movement of the lugs 59 and 60 on one of the chains as they are passed away from the plates and about the end sprockets 57. The continued movement of the conveyor chain will act on the trigger and through the connection 97 act on the carriage to move the same from the position shown in Figures 1 and 2 towards the extreme right end of the machine. The runway 99 is downwardly and forwardly inclined at its forward end so as to form a depressed slot 100 in which the trigger is forced thus permitting the pulling lug on the conveyor to escape its engagement with the trigger.

The carriage is returned to its initial position, adjacent the discharge end of the conveyor, by means of a counterweight which includes a flexible connection 101 fastened to the carriage adjacent its center and then trained about pulleys 102 and 103 as shown more particularly in Figures 1 and 2. The counterweight acting on the carriage not only draws the carriage forward but reacts on the trigger to return the same together with its connection 97 to their initial position ready to be engaged by the next lug as it swings on its right-to-left movement back to the receiving end of the machine.

Tracing out the application of power to the machine it will be understood that power of suitable magnitude to operate such a machine is applied through a main power chain drive 104 which is passed about a sprocket 105 mounted on the main drive shaft 89. A direct gear connection is provided between a gear 106 on the main shaft 89 and a gear 107 mounted on the elevator shaft 45. At one side of the machine as shown in Figure 2, power is taken off one end of the main shaft by means of a chain drive 108 to actuate the power roller 77. Power is also taken off the main shaft by means of the chain drive 109 to actuate a conveyor shaft 110 at the discharge end of the machine. The shaft 110 is provided with an interrupted gear 111 which periodically meshes with a gear 112 on the conveyor shaft 58. By this form of interrupted drive connection the conveyor is advanced by the teeth of the gear 111 until the plate bar on the plate coming into engagement with the stripping mechanism has cleared the knives and while the mutilated part 113 of the gear 111 is facing the gear 112, the cam 88 is functioning to bring the knives into operative engagement with the cathode plate. A chain connection 114 drives the roller 77 from a sprocket 115 at the end of the shaft 116 which carries the idler sprockets 56 of the conveyor 18.

In operation, it will be appreciated that the cathode plates are picked up one after the other from the incoming conveyor 16 are lifted by the elevator and permitted to fall gently into a horizontal position ready to be advanced by the conveyor 18. They are then advanced with the knives in open position so as to have the coating removed from opposite sides and from their edges by the action of the knives when the latter are moved into operative position. The plates are then advanced by the conveyor forcefully through the stripping mechanism and into position to be removed one by one from the discharge end of the conveyor and are passed off at the right hand end of the machine.

The copper plates constituting the coatings are removed in sheets with parallel sides defined by the V-shaped grooves 14 and these plates, substantially flat, are passed through the rolling action provided by the rollers 77, 80 so that the removal sheets are flat and need no straightening operation before they are deposited in the electrolytic vats. The edge strips 117 come away clean from the flat side sheets in the form of channel bars and as scrap metal is thrown into the melting pots with the finally formed plates. The oiled coating on the cathode plates insures the clean separation of the coatings from the plate in a manner not possible with any manually actuated chisel operation.

Having thus described my invention, I claim:

1. In a device of the class described, the combination of means for receiving metal-coated plates in vertical position and for laying the same in a horizontal position with one edge in advance, a coat-stripping-device normally disposed in an inoperative position, means for moving the horizontally disposed plate into position to be engaged by said stripping device, means having a timed relation to said last named means and operatively connected to the stripping device to move the same from its inoperative position engaging the advanced edge of said plate and means for moving the plates past the stripping device while in engagement therewith so as to remove the coating from the plate.

2. In a device of the class described, the combination of means for receiving metal-coated plates in vertical position and for laying the same in a horizontal position with one edge in advance, a coat-stripping-device normally disposed in an inoperative position, means for moving the horizontally disposed plate into a position to be engaged by said stripping device, means having a timed relation to said last named means and operatively connected to the stripping device to move the same from its inoperative position into an operative position engaging the advanced edge of said plate, means for moving

the plates past the stripping device while in engagement therewith so as to remove the coating from the plate and means for receiving the coat of metal stripped from the plate.

3. In a device of the class described, the combination of means for receiving metal-coated plates, a coat-stripping-device normally disposed in an inoperative position, means for moving the plate into a position to be engaged by said stripping device, means having a timed relation to said last named means and operatively connected to the stripping device to move the same from its inoperative position into an operative position engaging the plate and means for moving the plates past the stripping device while in engagement therewith so as to remove the coating from the plate.

4. In a machine for removing metallic coatings from plates having the coatings formed thereon, the combination of a sharp edge stripping device adapted to cleave the coatings from the plate, means for moving the device into operative engagement with the plate and in advance of the coating and means adapted to engage the plate to force the same past the stripping device while in engagement with the coating thereby to remove the coating from the plate.

5. In a machine for removing metallic coatings from the face of plates to which the coating adheres, the combination of a knife adapted to cleave the coating from the plate and power actuated means for effecting relative movement between the knife and plate in a direction to cause the knife to strip the coating forcefully from the plate.

6. In a machine for removing metallic coatings from the face of plates to which the coating adheres, the combination of a shiftable knife adapted to cleave the coating from the plate and power actuated means for effecting relative movement between the knife and plate in a direction to cause the knife to strip the coating forcefully from the plate, and means actuated in synchronism with the last named means for shifting the knife relative to the plate in timed relation to the advance and rear edge of the coating being stripped.

7. In a machine for treating coated plates of the type which includes a flat relatively thin body portion having a metal coated surface and a relatively thick end piece, of shiftable means for removing the coating from said surface and time controlled conveyor means for moving the plates with the end pieces in advance into position to be engaged by said removing means, for causing the conveyor means to delay for a period of time and then to continue to move the plate past the removing means and a control for said removing means operatively connected to the conveyor means to move the removing means out of the path of movement of the thick end piece.

8. In a device of the class described, the combination of means for feeding metal coated plates, while vertically disposed, means for moving the plates successively into a horizontal position, means for advancing the plates while in their horizontal position, and coat-stripping-means operatively associated with the horizontally moving plates to engage and remove the metallic coat from the plates.

9. In a device of the class described, the combination of means for feeding metal coated plates while vertically disposed, means for moving the plates successively into a horizontal position, counterweighted means for easing the movement of the plates into their horizontal position, means for advancing the plates while in their horizontal position and coat-stripping means operatively associated with the horizontally moving plates to engage and remove the metallic coat from the plates.

10. In a device of the class described, the combination of a plate feeding mechanism adapted to advance coated plates in one direction, an elevator at the charging end of said mechanism provided with means for engaging an upper portion of the plates to raise the plates successively and to advance the upper sides of the same in a turning movement, a stop for temporarily intercepting the forward movement of the lower side of the plates while permitting the upper side to fall forwardly into a horizontal position.

11. In a device of the class described, the combination of a plate feeding mechanism adapted to advance coated plates in one direction, an elevator at the charging end of said mechanism provided with means for engaging an upper portion of the plates to raise the plates successively and to advance the upper sides of the same in a turning movement, a stop carried by the elevator and vertically movable therewith for temporarily intercepting the forward movement of the lower side of the plates while permitting the upper side to fall forwardly into a horizontal position.

12. In a device of the class described, the combination of a plate feeding mechanism adapted to advance coated plates in one direction, an elevator at the charging end of said mechanism provided with means for engaging an upper portion of the plates to raise the plates successively and to advance the upper sides of the same in a turning movement, a stop for temporarily intercepting the forward movement of the lower side of the plates while permitting the upper side to fall forwardly into a horizontal position and a fixed back stop adapted to be engaged by the lower edge of the

plate to act as a fulcrum in its turning movement.

13. In a device of the class described, the combination of means for elevating vertically disposed plates and for laying them in horizontal position, said means including an elevator formed of oppositely disposed vertical arms, each arm including a pair of links pivotally connected, the upper link of each arm provided with a lift cup, the said cups coacting to engage opposite sides of one of said plates, to lift the same, guiding means engaging the upper links to advance the upper edge of the plates beyond the lower edges and thus inaugurate a turning movement.

14. In a device of the class described, the combination of means for elevating vertically disposed plates and for laying them in horizontal position, said means including an elevator formed of oppositely disposed vertical arms, each arm including a pair of links pivotally connected, the upper link of each arm provided with a lift cup, the said cups coacting to engage opposite sides of one of said plates, to lift the same, guiding means engaging the upper links to advance the upper edge of the plates beyond the lower edges and thus inaugurate a turning movement and a guide segment adapted to receive the upper portions of the plates discharged from the elevator to guide the same during their turning movement.

15. In a device of the class described, the combination of means for elevating vertically disposed plates for laying them in horizontal position, said means including an elevator formed of oppositely disposed vertical arms, each arm including a pair of links pivotally connected, the upper link of each arm provided with a lift cup, the said cups coating to engage opposite sides of one of said plates to lift the same, guiding means engaging the upper links to advance the upper edge of the plates beyond the lower edges and thus inaugurate a turning movement, a guide segment adapted to receive the upper portions of the plates discharged from the elevator to guide the same during their turning movement, and means for lowering the lift cups away from the plate when positioned on the guide segment.

16. In a device of the class described, the combination of means for elevating vertically disposed plates and for laying them in horizontal position, said means including an elevator formed of oppositely disposed vertical arms, each arm including a pair of links pivotally connected, the upper link of each arm provided with a lift cup, the said cups coacting to engage opposite sides of one of said plates, to lift the same, guiding means engaging the upper links to advance the upper edge of the plates beyond the lower edges and thus inaugurate a turning movement, a guide segment adapted to receive the upper portions of the plates discharged from the elevator to guide the same during their turning movement, and means for easing the movement of the plates while sliding down said guide segment.

17. In a device of the class described, means for elevating vertically disposed plates and for laying them in horizontal position, said means including an elevator adapted to raise the plates, said elevator having a slightly forward movement at the end of its lifting movement, means for delaying the forward movement of the lower edges of the plates as the upper edges are moved forwardly by the elevator, a guide segment positioned to receive the upper portion of the plates discharged from the elevator.

18. In a device of the class described, means for elevating vertically disposed plates and for laying them in horizontal position, said means including an elevator adapted to raise the plates, said elevator having a slightly forward movement at the end of its lifting movement, means for delaying the forward movement of the lower edges of the plates as the upper edges are moved forwardly by the elevator, a guide segment positioned to receive the upper portion of the plates discharged from the elevator and counter-balancing means positioned to be engaged by the plates while on the guide segment for easing the movement of the plates into their horizontal position.

19. In a device of the class described, the combination of means for advancing a series of vertically disposed metallic coated plates, means for successively elevating the plates in order and for laying the same in horizontal position and cutting mechanism operatively disposed to engage said succeeding plate as it is advanced to the cutting mechanism to strip the coating from the plate in the form of a sheet of metal.

20. In a device of the class described, the combination of means for advancing a series of vertically disposed metallic coated plates, means for successively elevating the plates in order and for laying the same in horizontal position, cutting mechanism operatively disposed to engage said succeeding plate as it is advanced to the cutting mechanism to strip the coating from the plate in the form of a sheet of metal and means for advancing the plate through the cutting mechanism.

21. In a device of the class described, the combination of means for advancing a series of vertically disposed metallic coated plates, means for successively elevating the plates in order and for laying the same in horizontal position, cutting mechanism operatively disposed to engage said succeeding

plate as it is advanced to the cutting mechanism to strip the coating from the plate in the form of a sheet of metal, means for advancing the plate through the cutting mechanism and means for advancing the sheet coating removed by the cutting mechanism away from the said mechanism.

22. In a device of the class described, the combination of means for advancing a series of vertically disposed metallic coated plates, means for successively elevating the plates in order and for laying the same in horizontal position, cutting mechanism operatively disposed to engage said succeeding plate as it is advanced to the cutting mechanism to strip the coating from the plate in the form of a sheet of metal, means for advancing the plate through the cutting mechanism and means for receiving the stripped plate from said last named advancing means and for removing the plates from the device.

23. In a device of the class described, the combination of means for receiving vertically disposed coated plates and for laying the same into horizontal position, means for guiding the plates into their horizontal positions, means for stripping the coats from the plates and means for advancing the plates while in their guided horizontal position to and through the stripping means.

24. In a device of the class described, the combination of means for receiving vertically disposed coated plates and for laying the same into horizontal position, means for guiding the plates into their horizontal positions, means for stripping the coats from the plates, means for advancing the plates while in their guided horizontal position to and through the stripping means and means operatively associated with said plate laying means for controlling the actuation of the stripping means whereby the stripping means is caused to engage the plates in succession as they are fed to the stripping means.

25. In a device of the class described, means for stripping metal coatings from cathode plates including the combination of a conveyor for moving the plates to and through their position when engaged by the stripping means, a timed control operatively associated with both the stripping means and with the conveyor for first moving the plate into position to be engaged by the stripping means and for stopping the conveyor when the plate is in said position for moving the stripping means into operative engagement with the plate and for then advancing the plate with the stripping means in operative engagement with the plate to remove the coating.

26. In a device of the class described, means for stripping metal coatings from cathode plates including the combination of a conveyor for moving the plates to and through their position when engaged by the stripping means, a timed control operatively associated with both the stripping means and with the conveyor for first moving the plate into position to be engaged by the stripping means and for stopping the conveyor when the plate is in said engagement with the plate and for then advancing the plate with the stripping means in operative engagement with the plate to remove the coating and power means operatively connected to said timed control for withdrawing the plates constituting the coating.

27. In a machine of the class described, the combination of means for advancing a coated plate along a path of movement, coat-stripping means extending across said path of movement and adapted to engage the coated plate to peel the coating from the plate, means connected to said shearing means for moving the same to and from its position in coat-stripping engagement with the plate and in timed relation to the advance of the plate to the stripping means whereby the stripping means is removed from said path of movement as each plate passes the stripping means and is re-disposed in said path as the next succeeding plate is advanced into its position to be stripped.

28. In a device of the class described, the combination of means for advancing a coated cathode plate along a path of movement, a knife extending transversely of said path of movement inclined at an angle to said path and in a direction opposite to the direction of movement of the plate, said knife adapted to engage the coating to pry the same from the plate as the plate is moved past the knife.

29. In a device of the class described, the combination of means for advancing a coated cathode plate with its plate bar in advance, a pair of knives positioned on opposite sides of the path of movement of the plate, each of said knives extending across the line of movement of the plates and adapted to engage the coating on the adjacent side of the plate to remove the same and cam controlled means operatively connected to said knives for removing the same in opposite directions away from said path thereby to permit the plate bar to pass the knives and for restoring the knives to their operative engagement with opposite sides of the plate.

30. In a device of the class described, the combination of means for advancing a coated cathode plate with its plate bar in advance, a pair of knives positioned on opposite sides of the path of movement of the plate, each of said knives extending across the line of movement of the plates and adapted to engage the coating on the adjacent side of the plate to remove the same and

cam controlled means operatively connected to said knives for removing the same in opposite directions away from said path thereby to permit the plate bar to pass the knives and for restoring the knives to their operative engagement with opposite sides of the plate and means connected to said knives to cause the same to bear resiliently on both sides of the plate.

31. In a device of the class described, the combination of means for advancing a coated cathode plate with its plate bar, a pair of knives positioned on opposite sides of the path of movement of the plate, each of said knives extending across the line of movement of the plates and adapted to engage the same and means operatively connected to said knives for removing the same in opposite directions away from said path thereby to permit the plate bar to pass the knives and for restoring the knives to their operative engagement with opposite sides of the plates and a spring connected to one of the knives to cause the same to bear resiliently on the engaged side of the plate.

32. In a device of the class described, the combination of means for advancing a metallic coated cathode plate along a path of movement, a knife extending transversely of said path of movement and inclined towards said path in position to engage the metal coat and strip the same from the plate, a spring engaging said knife to cause the same to bear resiliently on said plate as the plate is moved past the knife.

33. In a device of the class described, the combination of means for advancing a metallic coated cathode plate along a path of movement, a knife extending transversely of said path of movement and inclined towards said path in position to engage the metal coat and strip the same from the plate, a cam controlled power means operatively connected to said knife to move the same to and from its operative engagement with the plate, said means including an adjustable tension means for regulating the pressure exerted by the knife on the plate during the stripping operation.

34. In a machine of the class described, the combination of a stripping device, a conveyor for advancing coated cathode plates through the machine, said conveyor provided with a pair of lugs each adapted in one position of the conveyor to engage and force the plate past the stripping device, a plate discharging carriage provided with means for engaging the plates discharged from the conveyor and for the removing the same from the machine, said carriage provided with a trigger adapted to be engaged by whichever of said lugs is not acting on a plate to move the carriage with a plate attached away from the conveyor.

35. In a machine of the class described, the combination of a stripping device, a conveyor for advancing coated cathode plates through the machine, said conveyor provided with a pair of lugs each adapted in one position of the conveyor to engage and force the plate past the stripping device, a plate discharging carriage provided with means for engaging the plates discharged from the conveyor and for removing the same from the machine, said carriage provided with a trigger adapted to be engaged by whichever of said lugs is not acting on a plate to move the carriage with a plate attached away from the conveyor, and means for restoring the carriage to its initial position when the trigger is freed of its actuating lug.

36. In the art of removing metallic coatings from the flat surfaces of plates on which the coatings are formed, the method which consists in prying up one edge of the coating at a point adjacent the center thereof and then progressively raising the coating from end to end by simultaneously prying the same up on opposite sides of a longitudinal medial line passing through said point and in directions outwardly in opposite directions from said medial line towards the side edges, each succeeding point in the lines of separation considered in a direction towards the medial line being slightly in advance of the next adjacent outer point in the lines.

37. In the art of removing coatings of copper and the like from cathode plates, the method which consists in prying one edge of the coating away from the plate, and forcing the coating away from the plate along a continuous transverse line while progressively moving from the pried up edge towards the opposite edge.

38. In the art of forming flat rectangular sheets of copper and like metal, the process which consists in electrolytically depositing a coating on a rectangular cathode plate which is provided with a pair of parallel grooves formed in its coat-receiving-surface engaging the plate with a knife having a cutting edge extending transversely across the grooves to pry the part of the coating between the grooves away from other parts of the coating to cause separation of the plate along the lines of said parallel grooves.

39. In the art of stripping copper and like coatings from cathode plates in forming copper plates, the method which includes the step of passing a knife from end to end across the plate, between the plate and the coating and in a direction at a small angle to all straight edges of the knife.

40. In the art of forming flat metal plates electrolytically, the process which consists in depositing a coating of the metal on opposite sides and edges of a cathode plate, the

sides of which have grooves formed therein adjacent to and parallel to each of the edges, and causing a pair of stripping devices to engage simultaneously the coatings on the opposite sides thereby to pry off the part of the coating on each side between the grooves in the form of a sheet having parallel edges while causing the edge pieces between the groove on one side and the adjacent groove on the opposite side to separate from the two sheets from the side of the plate.

41. In a device of the class described, the combination of a plate advancing endless conveyor provided with a plate engaging lug movable therewith, a carriage at the discharge end of said conveyor mounted for reciprocatory movement and provided with means for engaging the plates as they are discharged from said conveyor and for advancing the plates away from the conveyor, a connection with the carriage disposed in the path of movement of the lug and adapted to be engaged thereby so as to advance the carriage with its engaged plate as the conveyor is moved to advance a succeeding plate.

42. In a device of the class described, the combination of a plate advancing endless conveyor provided with a plate engaging lug movable therewith, a carriage at the discharge end of said conveyor mounted for reciprocatory movement and provided with means for engaging the plates as they are discharged from said conveyor and for advancing the plates away from the conveyor, a connection with the carriage disposed in the path of movement of the lug and adapted to be engaged thereby so as to advance the carriage with its engaged plate as the conveyor is moved to advance a succeeding plate, and a counterweight operatively connected to said carriage to return the same to its initial position adjacent the conveyor when relieved of the draft of the conveyor.

43. In a device of the class described, the combination of a plate advancing endless conveyor provided with a plate engaging lug movable therewith, a carriage at the discharge end of said conveyor mounted for reciprocatory movement and provided with means for engaging the plates as they are discharged from said conveyor and for advancing the plates away from the conveyor, a pull member disposed in the path of movement of the conveyor, a flexible connection having one end attached to the carriage and the other end attached to said pull member whereby the conveyor provides the power to actuate the carriage.

44. In a device of the class described, the combination of a plate advancing endless conveyor provided with a plate engaging lug movable therewith, a carriage at the discharge end of said conveyor mounted for reciprocatory movement and provided with means for engaging the plates as they are discharged from said conveyor and for advancing the plates away from the conveyor, a pull member disposed in the path of movement of the conveyor, a flexible connection having one end attached to the carriage and the other end attached to said pull member whereby the conveyor provides the power to actuate the carriage and means attached to the carriage for returning the same to its initial position when free of the pull of the conveyor.

45. In a machine for removing a metallic coating from the face of an electrode plate to which the coating adheres, the combination of a cutter adapted to cleave the coating from the plate and power actuated means for effecting relative movement between the cutter and the plate

46. A machine for removing an adherent metallic sheet from a plate comprising means for forcibly entering between them to effect separation and thereafter progressively cleaving them apart.

47. The method of removing a metallic coating from the face of an electrode plate to which the coating adheres, which comprises concurrently moving plate and coating edgewise in divergent directions.

Signed at Perth Amboy, in the county of Middlesex and State of New Jersey this 20th day of October, A. D. 1919.

CHARLES HOWDEN HILL.