Sept. 18, 1923. 1,468,181

C. WAGNER ET AL

DRYING APPARATUS FOR PLATES OF METAL AND OTHER MATERIAL

Filed June 8, 1922 6 Sheets-Sheet 1

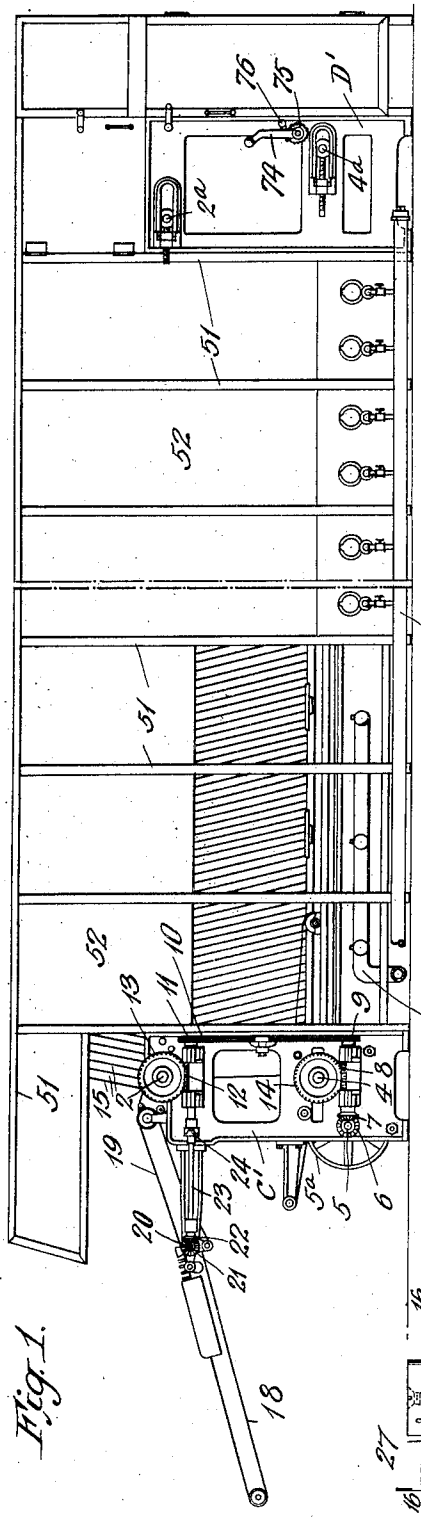


Fig. 1.

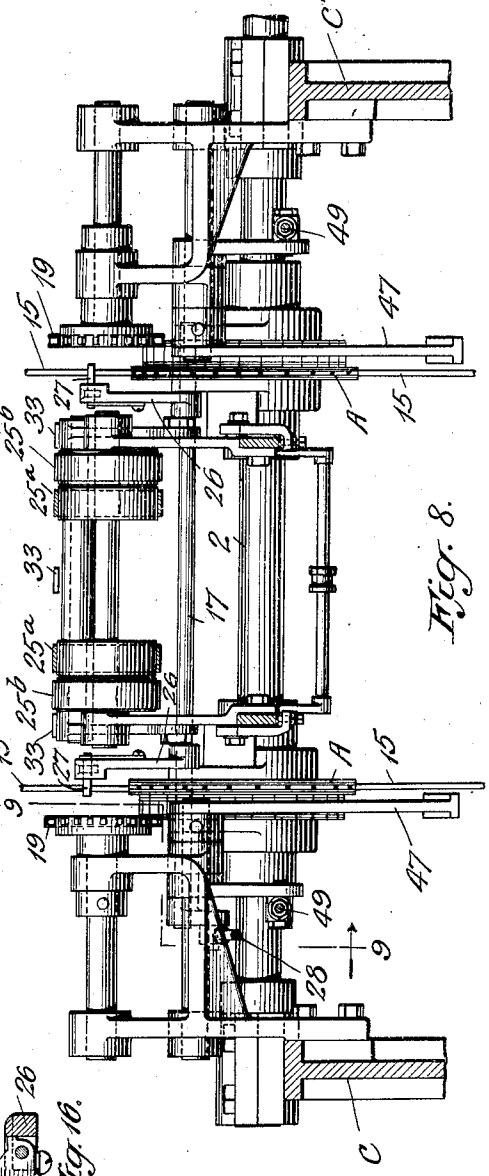


Fig. 8.

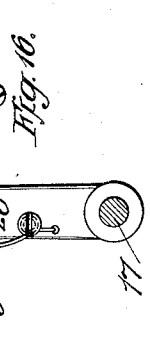


Fig. 15.

Fig. 16.

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DRYING APPARATUS FOR PLATES OF METAL AND OTHER MATERIAL

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Fig. 18.

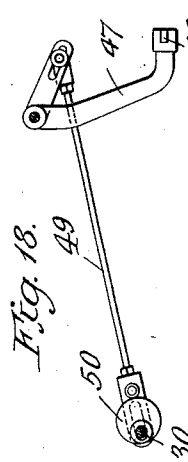


Fig. 2.

Fig. 17.

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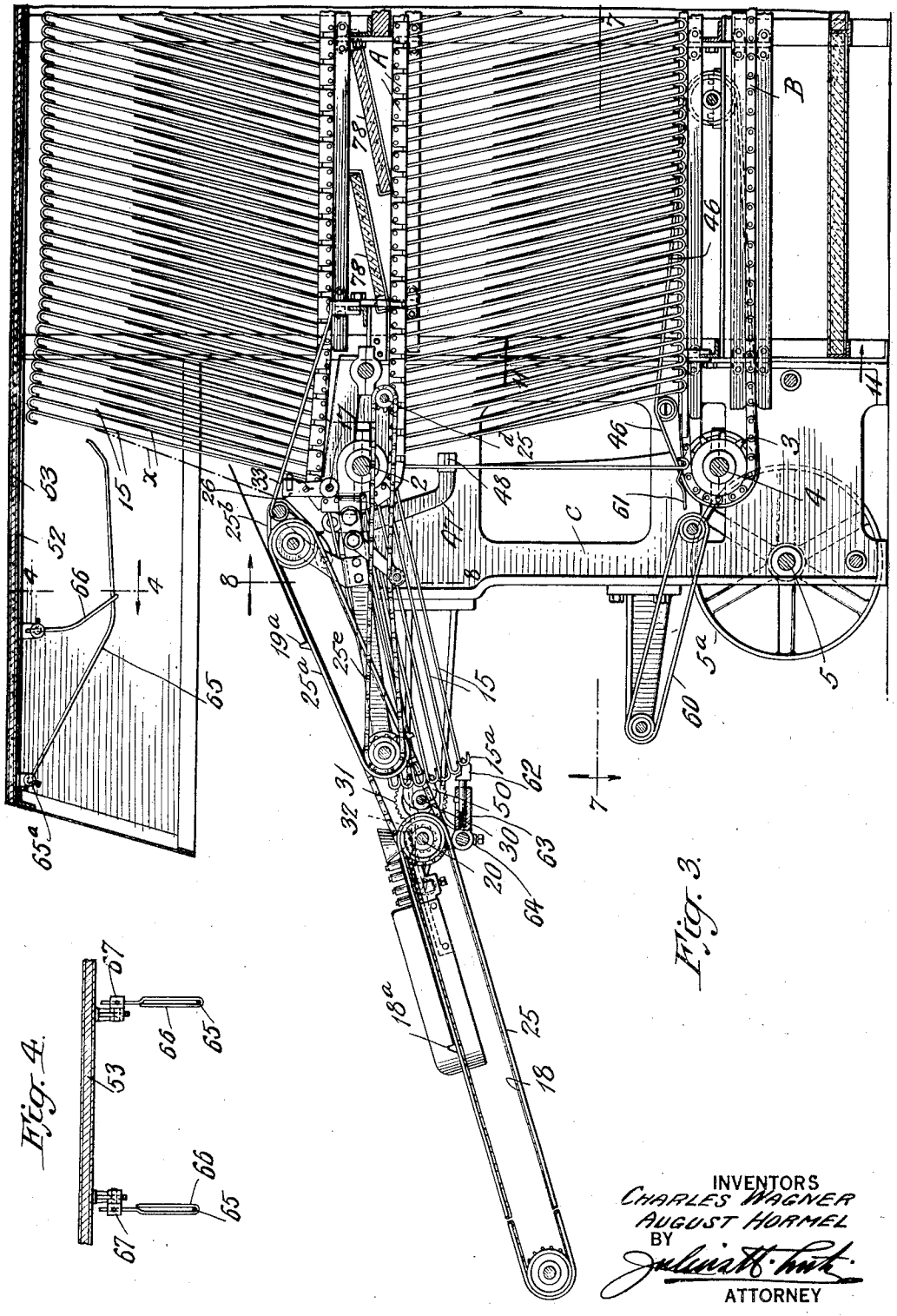


Fig. 3.

Fig. 4.

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DRYING APPARATUS FOR PLATES OF METAL AND OTHER MATERIAL

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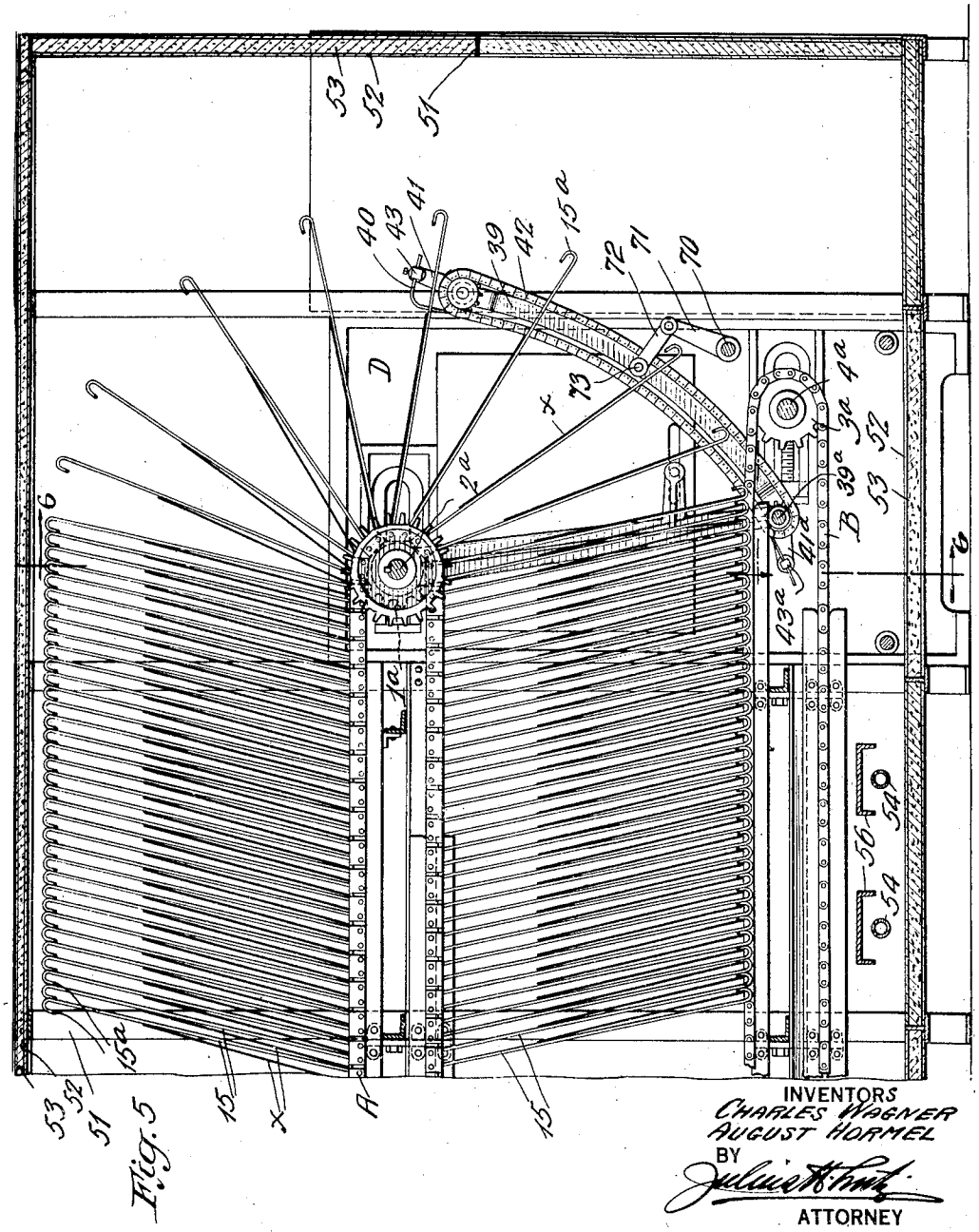


Fig. 5

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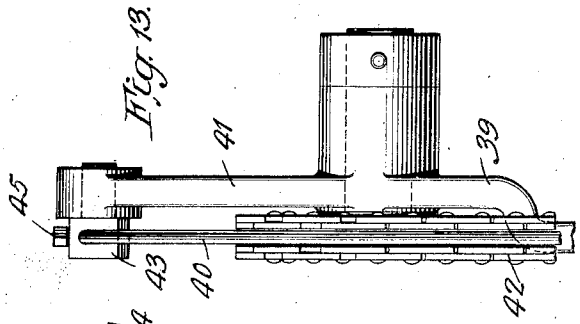


Fig. 13.

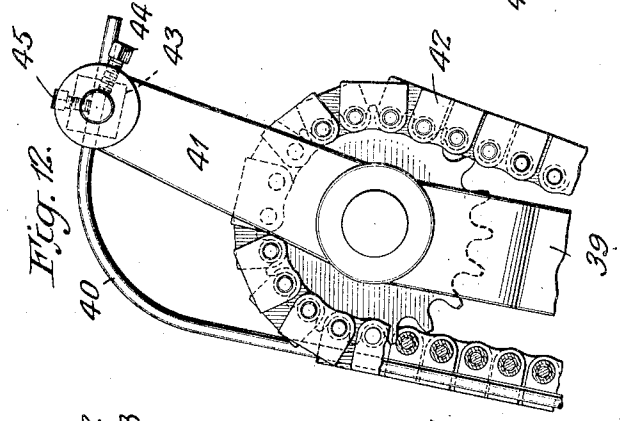


Fig. 12.

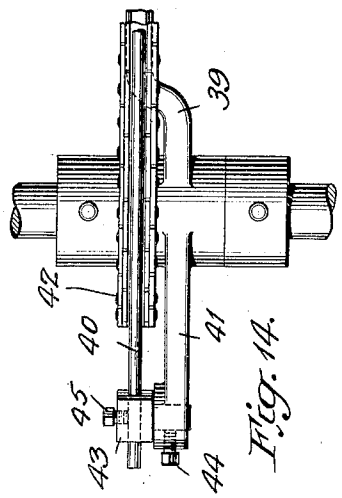


Fig. 14.

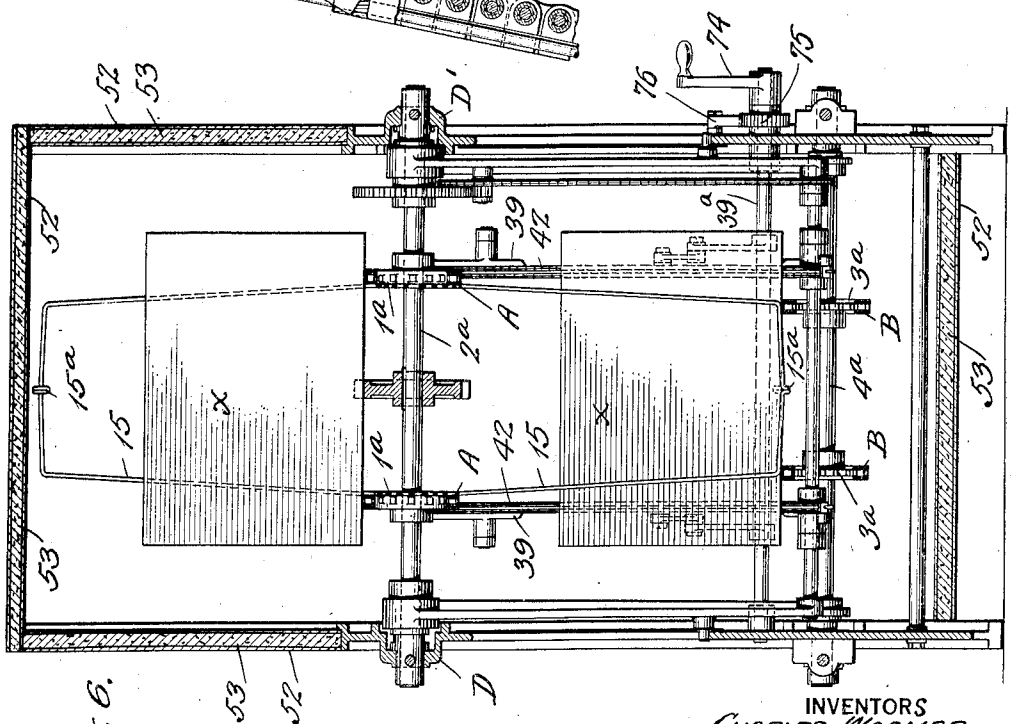


Fig. 6.

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DRYING APPARATUS FOR PLATES OF METAL AND OTHER MATERIAL

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Fig. 7.

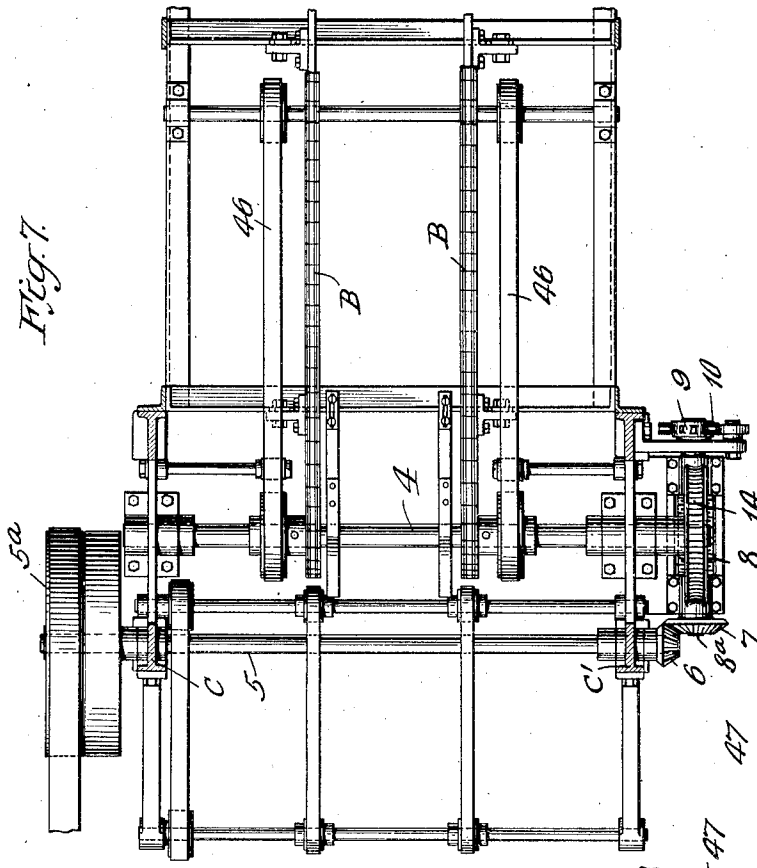
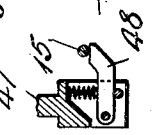


Fig. 10.



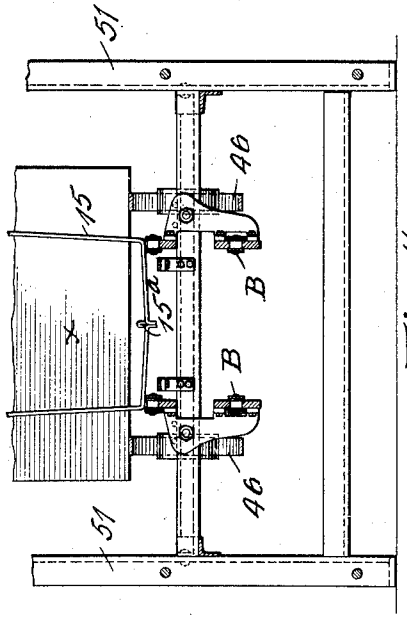


Fig. 11.

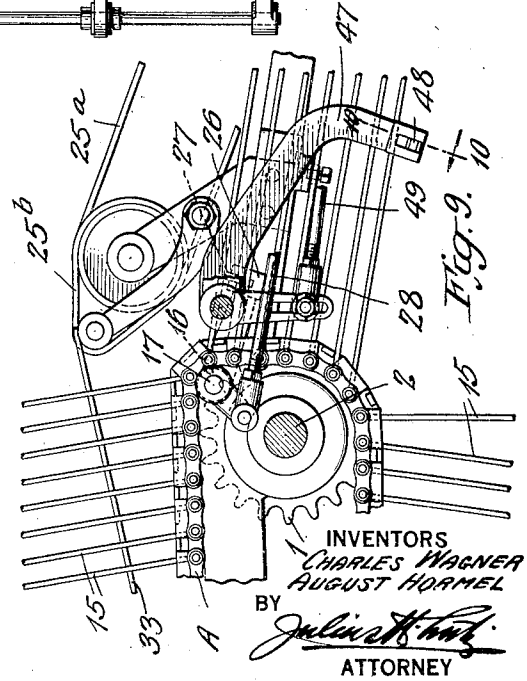


Fig. 9.

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Patented Sept. 18, 1923. 1,468,181

UNITED STATES PATENT OFFICE.

CHARLES WAGNER, OF GRANTWOOD, AND AUGUST HORMEL, OF JERSEY CITY, NEW JERSEY.

DRYING APPARATUS FOR PLATES OF METAL AND OTHER MATERIAL.

Application filed June 8, 1922. Serial No. 566,896.

To all whom it may concern:

Be it known that we, CHARLES WAGNER and AUGUST HORMEL, both citizens of the United States, and residents, respectively, of Grantwood, in the county of Bergen and State of New Jersey, and 260 Griffith Street, Jersey City, State of New Jersey, have invented certain new and useful Improvements in Drying Apparatus for Plates of Metal and Other Material, of which the following is a specification.

This invention relates to improvements in drying apparatus for plates of metal and other material.

The present invention is an improvement upon the drying apparatus described in applicants' Letters Patent No. 1,293,261 of February 4th, 1919, and in applicants' prior application Serial No. 340,201, filed November 24th, 1919.

One of the objects of this invention is to produce a drying apparatus embodying conveyor chains and plate carriers mounted thereon which will enable plates wet on one side with a coat of paint or like material to be handled in such a manner as to cause the coated surface to be dried in its passage in opposite directions through the apparatus without gripping the plates and without in any way engaging and thus marring the coated surface; and to this end we provide means whereby the plates in the manipulation thereof at one end of the machine are caused to have a sliding movement, instead of the usual swinging movement, and this sliding movement is preferably accomplished during the feeding of the plates between the plate carriers so that such wet plates may be fed into, supported in substantially upright position, conveyed through the apparatus in one direction and then swung around and conveyed in the opposite direction without engaging the wet or newly coated surface.

Another object is to provide means for feeding plates into an apparatus of the character described by a continuous sliding movement from a substantially horizontal position to a supported position between plate holders which is slightly inclined from the vertical in the direction of the conveying movement of such plates.

Another object of our invention is to provide, in combination, a pair of spaced conveyor-chains, a series of plate holders mounted on one of such conveyor chains, feed mechanism adapted to feed plates having a wet coat on one side to said holders by a gradual upward sliding movement and without turning until such plates are in supported positions inclined in the direction of conveying movement; means for transferring said plates to the other chain by a swinging movement in the direction of inclination of the plates so as to accomplish such transfer by engagement with the dry side of the plate and means for guiding the plate holders during the opposite movement thereof to cause the inclination thereof to be changed so as again to be inclined in the direction of the forward movement thereof.

Another object of our invention is the provision of means for producing greater opening between adjacent plate holders for the purpose of more readily sliding a plate between adjacent holders. This is preferably accomplished during the feeding movement and comprises the combination with a conveyor chain having a series of plate holders mounted thereon, of means for causing said conveyor chain to traverse a non-circular path and preferably to pass over a sharp curve or corner in its movement from the bottom stretch to the top stretch so as to cause a sharp break in the chain and an opening of greater extent between adjacent plate holders than would occur if the chain traversed a gradual circular path.

Another object of our invention is the provision, in combination with a pair of conveyor chains, of a series of plate holders which are arranged to support plates in rearward travel on one chain and to transfer the plates to forward travel on the other chain by contact with one side of the plate only, and to this end we provide means for causing said plate carriers during their travel rearwardly to assume rearwardly-inclined plate-supporting positions and during their travel forwardly to assume forwardly-inclined plate-supporting positions whereby supporting contact during both

rearward and forward movements will be maintained with the same side of the plate.

Another object of our invention is to provide a simplified spacing device for the top of the plate holders comprising a laterally-extending hook at the top of each plate-holder which is adapted to abut against an adjacent holder.

Another object is the provision, in combination with a conveyor chain supported to traverse a sharp curve, of conveying belts for slidingly feeding a plate in an upwardly-inclined position between adjacent plate holders and preferably so conveying such plates above the plane of movement of such belt and into sliding and then supporting contact with a plate holder retained in a position inclined in the direction of movement of the chain.

Another object of our invention is the provision, in combination with a conveyor chain and plate holders arranged in an initial position inclined in the direction of movement so as to carry plates having engagement at one edge on the top stretch and to cause a lowering thereof in the same direction during the movement of the chain from its top rearwardly moving stretch to its bottom forwardly moving stretch, of transfer means adapted to engage the opposite edge and to cause a positive movement of the plates and to prevent any excessive sliding thereof during the transfer from one chain to the other.

With these and other objects in view, the invention comprises the combination of members and arrangement of parts so combined as to co-act and cooperate with each other in the performance of the functions and the accomplishment of the results herein contemplated, and comprises in one of its adaptations the species or preferred form illustrated in the accompanying drawings, in which:—

Fig. 1 is a side elevation of a drying apparatus embodying our invention;

Fig. 2 is a fragmentary plan view of the front portion of the mechanism shown in Fig. 1, the casing being cut away and illustrated in section;

Fig. 3 is a section on the line 3—3 of Fig. 2 of the front portion of the machine,

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary sectional view similar to Fig. 3 of the rear end of the apparatus;

Fig. 6 is a vertical section on the line 6—6 of Fig. 5 looking in the direction of the arrow;

Fig. 7 is a section on the line 7—7 of Fig. 3 looking in the direction of the arrow and particularly showing the delivery mechanism in plan;

Fig. 8 is an enlarged section on the line 8—8 of Fig. 3 looking in the direction of the arrow and particularly illustrating the plate holder controlling mechanism;

Fig. 9 is an enlarged fragmentary section on the line 9—9 of Fig. 8 looking in the direction of the arrow;

Fig. 10 is a detail view on the line 10—10 of Fig. 9;

Fig. 11 is a section on the line 11—11 of Fig. 3 looking in the direction of the arrow;

Fig. 12 is an enlarged view in side elevation of the upper end of the transfer means shown in Fig. 5;

Fig. 13 is an end view of the portion of the transfer means shown in Fig. 12;

Fig. 14 is a top view of that portion of the transfer means shown in Figs. 12 and 13;

Fig. 15 is a detail view of a lifting arm for raising the plate holders from horizontal to rearwardly-inclined position;

Fig. 16 is a section on the line 16—16 of Fig. 15;

Fig. 17 is a diagrammatic view of the mechanism operating the lifting arms illustrated in Fig. 15; and

Fig. 18 is a view similar to Fig. 17 of lifting means for operating the plate holders to allow the falling of plates on to the delivery belts.

Referring now to these drawings, which illustrate a preferred embodiment of our invention, our plate drying apparatus embodies the following elements;

The conveyor chains.

Two pairs of endless conveyor chains A and B respectively are mounted in vertically spaced relationship to each other. These two pairs of conveyor chains are mounted in frame castings arranged in pairs C—C′ and D—D′ at the front and rear of the machine respectively.

The members of the upper pair of chains A extend parallel to each other and are adapted to convey plates in one direction or rearwardly, and the members of the lower pair of chains, which also extend in parallel relationship, are adapted to convey the plates in the opposite direction or forwardly. As illustrated, the upper pair of chains are mounted at opposite ends upon front and rear sprockets 1—1ª fast on front and rear shafts 2—2ª journalled in said frame castings; and the lower pair of chains are likewise mounted at their opposite ends upon front and rear sprockets 3—3ª fast upon front and rear shafts 4—4ª. The drive shafts 2 and 4 for the upper and lower chains are, as illustrated, driven synchronously from a power-shaft 5. Said power shaft 5 is, as illustrated, rotated from any suitable source of power, such as the main drive pulley 5ª and as shown transmits power through the intermeshing bevelled

gears 6 and 7 to worm 8 on the worm shaft 8a. A sprocket 9 fast on said worm shaft rotates, by means of sprocket chain 10, another sprocket 11 fast on a shaft 11a and having a worm 12 mounted thereon, and the two worms 8 and 12 mesh with upper and lower worm wheels 13 and 14 fixed on upper and lower front shafts 2 and 4, on which are mounted the chain sprockets 1 and 2. This arrangement causes the two shafts 2 and 4 and sprockets 1 and 2 to rotate synchronously in opposite directions for the purpose of driving the upper and lower pairs of chains A and B respectively.

The plate holders.

The upper pair of conveyor chains are preferably of the type shown in our former application for Transfer Chains for Drying Apparatus, Serial No. 452,632, and have pivotally mounted thereon a plurality of plate holders 15 which, as shown, comprise frames each preferably formed of a strand of wire spanning the members of the upper pair of chains and mounted at opposite ends on the opposite links of the said pair of chains. Said plate holders are each bent intermediate its ends substantially in rectangular conformation, except at the top center which is further bent forwardly in the form of a hook 15a which is adapted to abut against an adjacent holder and spaces such holder from the adjacent holder. These hooks are preferably formed integrally by bending the single strand of wire comprising a plate holder intermediate its ends and when so bent adds reinforcement thereto.

In the preferred embodiment shown, the opposite ends of the plate holders are pivotally connected on an axle which connects two adjacent links of the conveyor chain composed of a series of links each having a central abutment, which abuts at the opposite edge of the chain against the ends of adjacent links to limit the sagging of the chain and also forms the ends of a slot between adjacent links which is variable in length in accordance with the position of the links and which limits the pivotal movement of the plate holders in opposite directions from the perpendicular. Obviously, when the chain is turning around a curve these abutments will permit a greater degree of pivotal movement of the holders and it will be apparent that in a device of this character the sharper the curve of the chain the greater degree of pivotal movement of the pivoted plate holders will be permitted. It will be seen, therefore, that with a chain so formed the plate holders may, when the chain is horizontally-disposed and on its rearwardly moving stretch, be retained in an initial position inclined to the perpendicular and when means are provided as hereinafter explained for causing the chain to traverse a sharp curve an opening of relatively great extent may be formed between adjacent plate holders.

In accordance with our present invention we provide means at one end, and preferably at the front end of the upper chains, for causing the said upper pair of chains to traverse such a sharp corner or curve. As shown, we provide a roller 16 pivoted on a shaft 17 for causing the chain A at said front end to traverse a sharp curve and thus permit a wider opening between adjacent plate holders to be produced, and we take advantage of this relatively wide space to provide means for causing a sliding movement of the plates to cause the dry side thereof only to contact with a plate holder and we maintain such contact with the dry side only in the passage of the plate through the apparatus. In the preferred form of our invention illustrated, we provide means for slidingly feeding plates between an opening thus produced and into contact with a rearwardly inclined plate holder on the rearwardly moving stretch of the upper chain.

The feeding mechanism.

The feeding mechanism embodies a series of pairs of conveyor chains and supporting belts which are adapted to feed a plate from a feeding table (not shown) into the space between adjacent plate holders.

As illustrated, this feeding mechanism comprises a pair of lower conveyor chains 18, upper conveyor chains 19, said chains having projections 18a—19a which engage a plate laid thereon, said chains being driven by sprockets 18b and 19b respectively, mounted on a shaft 20 having bevel gear 21 meshed with bevel gear 22 on the end of a short shaft 23 driven by and having a clutch-connection 24 to the worm shaft 11a. The upper end of the pair of upper chains preferably is positioned above the plane of the main conveyor chains A and a plate X when mounted thereon will be fed into contact with a rearwardly-moving plate holder 15, so that the top edge of the rear dry side of such plate will engage the rearwardly-inclined plate holder intermediate its ends in a sliding contact. A series of pairs of intermediate supporting belts 25—25a which lie in the same plane as their respective conveyor chains and also a pair of short extension belts 25b are provided and driven synchronously with said chains. Thus, the belts 25 are driven by pulleys mounted on shaft 20, while belts 25a and 25b are driven from shaft 20 by sprocket chains 25c, driving shaft 25d and sprocket chain 25e.

We preferably provide means for positively swinging the plate holders into plate supporting position and for this purpose we provide rocking arms 26 having latches 27

which when lowered engage a plate holder and swing the same into plate supporting position. These arms are connected by rods 28 with cams 29 on shaft 30 which is rotated synchronously with the upper chains by means of gear 31 meshing with gear 32 mounted on the shaft 20.

It may be seen, therefore, that a plate is fed into supporting contact with a plate holder and between it and the adjacent plate holder by an upwardly sliding movement and without engaging or touching the upper wet surface of such plate and the plate will thereafter be supported and conveyed in an inclined position by the upper pair of chains to the rear of the apparatus.

When the plate is thus fed above the plane of the upper chain and supported by a plate holder inclined in the direction of conveying movement, we preferably provide downwardly-inclining guide rods 33 along which the plate will be moved till it reaches the chains and is then moved rearwardly by the upper conveyor chains A to the rear of the machine, and during such movement is subjected to the heat produced by a gas flame as hereinafter specified.

When plates are so fed into the apparatus and supported it will be seen that they may be transferred to the lower pair of chains by a movement of the plate holders in the same direction in which the same are inclined and the transferring of the same may then be accomplished without engaging the wet side of the plate.

The transfer mechanism.

In order to procure positive transfer of the plates to the lower chain without excessive sliding movement thereof, we preferably provide an auxiliary conveyor chain preferably arranged in a curved path between the planes of the upper and lower chains, so that the edges of the plate opposite to that on which it is supported on the upper chains will be engaged and positively fed forwardly to the lower chains as the plate holders move beyond the horizontal position in their travel over the rear sprockets 1^a in the transferring movement.

As illustrated, we provide a pair of such transfer chains which are mounted upon sprockets arranged at opposite ends of arms 39. These transfer chains are guided to move in an arcuate path by means of guide rods 40 which are connected at opposite ends to extensions 41 and 41^a of the arms 39. As illustrated, the transfer chains 42 are each formed of U-shaped links so as to permit a guide rod 40 to seat in a groove on the top edge of the chain for the purpose of guiding the same in an arcuate path as hereinabove specified. The guide rod is suitably adjusted and held by rod holders 43 and 43^a pivoted in the extension arms 41 and 41^a and may be adjusted pivotally by the adjusting screws 44. The body movement of the guide rod in relation to the holder is controlled by an adjusting screw 45.

These transfer chains are arranged at opposite sides of the plate holders, as aforesaid, and engage the said opposite edges of the plates at opposite sides of the middle thereof and guide the same on to the lower chain B while the plate holders at all times remain in engagement with the same side of the plate. The turning movement of such plate holders is limited so that in the forward travel thereof the hook ends thereof are engaged by the lower transfer chain and they are caused to assume a position inclined to the vertical in the opposite direction from that on the top stretch. This is accomplished by a contact of the plate holder with the lower chain which causes the plate holder to move pivotally on the axle of the link out of contact with one limiting abutment toward the adjacent abutment so as to incline in the opposite direction, and the plate is, therefore, always maintained with its dry side in engagement with the plate holders. The plates are then moved by the lower chain through the machine to the front end thereof where they are delivered through an opening to a delivery belt in fully dried condition.

We preferably provide means for moving the transfer chains toward and away from the ends of the upper conveyor chains to adjust the size of the space or passage between such conveyor and transfer chains to adapt the same for varying sizes of plates and to prevent excessive sliding movement of plates of relatively small size.

As illustrated, the supporting arms 39 for the transfer chains are mounted pivotally on a shaft 39^a supported in the rear castings. We also mount in the rear castings intermediate the ends of said arms 39, a rotatable shaft 70, on which shaft are mounted link arms 71 and contact arms 72 having pivotal connections at 73 with the supporting arms 39. Obviously, upon rotation of the shaft 70 the link arm 71 will transmit power to the contact arm 72 and move the arms 39 and chains mounted thereon inwardly or outwardly as desired. Suitable means is provided for rotating the shaft 70, and as shown, the said shaft is extended to the outer side of the casing and is provided with a crank handle 74 for manual rotation and a ratchet 75 on said shaft cooperates with a pawl 76 pivotally mounted above the same to maintain the shaft in any position thereof and thus to position the arms 39 and the chains carried thereby.

At the delivery end of the lower conveyor belt, we preferably provide upwardly inclined guide belts 46 which retard the movement of the lower edges of the plates and

at the end of this guide which terminates at the front of the machine, we provide rocking arms 47 which successively engage the plate holders and move the same upwardly and outwardly in an arcuate path so as to permit the plate to fall by gravity on a delivery means by which it is shifted to a pile (not shown) at the front of the machine. In the form illustrated herein, the rocking arms 47 are provided with latches 48 which engage behind the plate holder and said arms are rocked synchronously by means of connecting rods 49 and cams 50 mounted on the shaft 30. By their rocking movement, the arms 47 swing the plate holder pivotally in an outward direction and allow the plate to fall, supported side down, on delivery belt 60.

After disengagement by the lower chains B the plate holders are preferably retarded in their initial upward swinging movement by the upper chains A by spring arms 61 until engaged by the arms 47 which thereupon swing the plate holder upwardly into engagement with spring-pressed latches 62 arranged in sockets 63 mounted on brackets 64 extending from the shaft 20. In this way, a plurality or series of plate holders comprising those holders mounted on the chain links passing over the front sprockets may be bunched and retained out of the path of the feed belts and also out of the path of the falling plates as the same are delivered to the delivery belts.

Guard means.

Means are preferably provided for guarding against or preventing the backward movement, during feeding of the plates into the machine and for this purpose I mount on the roof of the machine at the front thereof a pair of guard rods 65 which extend alongside of the path of the plate holders and in case of the fouling of a plate in the feeding movement thereof will prevent a falling of the plate backwardly out of the machine. As illustrated, these rods are adjustably mounted at one end in holders 65^a pivotally mounted on the roof of the machine; are retained in guarding position by loops 66 also adjustably mounted in holders 67 and have their free ends positioned adjacent to the face of the plates X when in initial position for conveyance through the apparatus.

The casing.

The opposite sides and ends of the apparatus are preferably enclosed by any suitable casing means so as to confine the heat within the same, and, as illustrated, this casing has a metal frame 51, a cover of sheet metal 52 and a lining 53 of a suitable heat resisting or insulating material, such as asbestos. The casing is, as shown, enclosed at the two sides, at the top and at the rear end, but has openings at the front end contiguous to the delivery outlet for the plates and a hood or shed is preferably provided over the front end to assist in confining the heat within the apparatus.

The heaters.

The casing may be heated in any suitable manner and is provided, as shown, with heaters comprising preferably pipes 54 constituting burners which receive gas or other suitable fuel from a supply pipe 55. The burners, as illustrated, pass through inverted U-shaped hoods 56 which assist in effecting a uniform diffusion of heat. These heaters are positioned at suitable intervals along the casing at the bottom thereof to provide a suitable degree of temperature to dry the plates in the passage of the same through the casing. We also preferably provide at the front of the machine and between the upper stretches of conveyor chains a series of deflectors or partitions 78 which serve to deflect to the rear of the machine above the upper transfer chain the warm currents of air supplied by air pipes 77 suitably supported beneath the lower conveyor chain, thus causing a circulation of a current of air through the machine from the front portion thereof above the upper conveyor chains rearwardly to the end of the machine, and thence forwardly between the upper and lower chains, which circulating air currents assist in evaporating the moisture and drying the plates in their passage through the machine.

Having described our invention, we claim:—

1. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted to move in said casing, plate holders mounted on said chain and means for causing a plate to be moved edgewise into engagement with a plate-holder during movement of such plate holders by the chain.

2. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted to move in said casing, plate holders mounted on said chain and means arranged at one end of said conveyor chain for causing one edge of a plate to engage a plate holder at an angle and to have a sliding contact therewith during movement into supported position on the chain.

3. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted to move in said casing, plate holders mounted on said chain and feed mechanism at the front of the machine for slidingly feeding a plate directly into the space between adjacent plate holders and causing one edge of the plate to engage a plate

holder at an angle and to have a sliding contact therewith during movement into supported position on the chain.

4. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted to move in said casing, plate carriers mounted on said chain and feed mechanism for slidingly feeding a plate directly into the space between adjacent plate holders and causing one edge of the plate to engage a plate holder at an angle and to have a sliding contact therewith during movement into supported position on the chain, said means comprising conveyor chains extending at an angle to the plate-supporting position of the plate holders.

5. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted in said casing, plate holders mounted on said chain and feed mechanism for slidingly feeding a plate between adjacent plate holders, comprising a plurality of conveyor chains mounted at the front of the machine and disposed above the plane of the conveyor chain to cause the plates to engage the plate holders intermediate the top and bottom thereof during rearward movement thereof.

6. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted in said casing, plate holders mounted on said chain and feed mechanism for slidingly feeding a plate between adjacent plate holders, comprising a plurality of conveyor chains mounted at the front of the machine and disposed above the plane of the conveyor chain to cause the plates to engage the plate holders intermediate the top and bottom thereof during rearward movement thereof and means for causing an opening of relatively large extent between adjacent plate holders.

7. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted in said casing, plate holders mounted on said chain and feed mechanism for slidingly feeding a plate between adjacent plate holders, comprising a plurality of conveyor chains mounted at the front of the machine and disposed above the plane of the conveyor chain to cause the plates to engage the plate holders intermediate the top and bottom thereof during rearward movement thereof, means for causing an opening of relatively large extent between adjacent plate holders and means moving synchronously with the feeding means for positively swinging a plate-holder independently of the conveyor chain into plate supporting position after the feeding of a plate to a contiguous holder.

8. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted in said casing, plate holders pivotally mounted on said chain; means at one end of the machine for causing a sharp curve or break in said chain and means for causing a plate to be fed in the opening between holders produced by such sharp curve and to slide at an angle to and into guiding and supporting contact with a holder.

9. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted in said casing, plate holders pivotally mounted on said chain; means at the front end of the machine for causing a sharp curve or break in said chain; feeding means for causing a plate to be fed in the opening between holders produced by such sharp curve and to slide at an angle to and into guiding and supporting contact with a holder, which feeding means comprises conveyor chains extending at an angle to the plate-supporting position of the plate holders.

10. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted in said casing, plate holders pivotally mounted on said chain, means at the front end of the machine for causing a sharp curve or break in said chain; feeding means for causing a plate to be fed in the opening between holders produced by such sharp curve and to slide at an angle to and into guiding and supporting contact with a holder, which feeding means comprises a plurality of conveyor chains mounted at the front of the machine and disposed above the plane of the conveyor chain to cause the plates to engage the plate holders intermediate the top and bottom thereof during rearward movement thereof.

11. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted in said casing, plate holders pivotally mounted on said chain, means at the front end of the machine for causing a sharp curve or break in said chain, feeding means for causing a plate to be fed in the opening between holders produced by such sharp curve and to slide at an angle to and into guiding and supporting contact with a holder, which feeding means comprises a plurality of conveyor chains mounted at the front of the machine and disposed above the plane of the conveyor chain to cause the plates to engage the plate holders intermediate the top and bottom thereof during rearward movement thereof, and means moving synchronously with the feeding means for positively swinging a plate-holder independently of the conveyor chain

into plate supporting position after the feeding of a plate to a contiguous holder.

12. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted to move in said casing, plate holders pivotally mounted on said chain; means for causing the same in the carrying stretch to assume a position inclined to the perpendicular in the direction of movement of the chain, means for slidingly feeding a plate to such inclined carrier, a lower conveyor chain moving in the opposite direction; means for transferring the plates to such lower chain by a continuous movement in the same direction and means on the lower chain for limiting the swinging movement of the plate holder to an inclination in the opposite direction from the perpendicular during the forward travel of plates through the machine.

13. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted to move in said casing, plate holders pivotally mounted on said chain, means for feeding a plate to such carrier, a lower conveyor chain moving in the opposite direction, means for transferring the plate to such lower chain and a transfer chain for engaging the edges of the plates during the transfer thereof from upper chain to the lower.

14. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a continuous conveyor chain mounted to move in said casing, plate holders pivotally mounted on said chain; means for slidingly feeding plates to such holders, a lower conveyor chain moving in the opposite direction; means for transferring the plate to such lower chain by a continuous movement in the same direction, a transfer chain for engaging the edges of the plates during the transfer thereof from the upper chain to the lower and means for guiding said transfer chain to traverse an arcuate path.

15. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a continuous conveyor chain mounted to move in said casing, plate holders pivotally mounted on said chain; means for slidingly feeding plates to such holders, a lower conveyor chain moving in the opposite direction; means for transferring the plate to such lower chain by a continuous movement in the same direction, a transfer chain for engaging the edges of the plates during the transfer thereof from the upper chain to the lower and means for pivotally supporting and swinging said transfer chain to vary the distance between one end thereof and the upper conveyor chain to accommodate varying sizes of plates.

16. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a conveyor chain mounted in said casing, plate holders pivotally mounted on said chain; means for causing the same in the carrying stretch to assume a position inclined in the perpendicular in the direction of movement of the chain, means for slidingly feeding a plate to such inclined carrier, a lower conveyor chain moving in the opposite direction, means for transferring the plate to such lower chain by a continuous movement in the same direction, a transfer chain for engaging the edges of the plates during the transfer thereof from the upper chain to the lower and a guide rod retained in engagement with said chain and means for bending the said rod into an arcuate form to cause the chain to traverse such a path.

17. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a continuous conveyor chain mounted to move in said casing, plate holders pivotally mounted on said chain; means for feeding plates to such holders, a lower transfer chain moving in the opposite direction, a transfer chain for engaging the edges of the plates during the transfer thereof from upper chain to the lower, means for guiding said transfer chain to traverse an arcuate path and means for pivotally supporting and swinging said transfer chain to vary the distance between one end thereof and the upper conveyor chain.

18. In an apparatus for drying wet plates, the combination with a casing having suitable drying means, of a continuous conveyor chain mounted to move in said casing, plate holders pivotally mounted on said chain; means for feeding plates to such holders and means for causing a circulation of air in a rearward direction above the upper transfer chain and in a forward direction between it and the lower chain, comprising air blowing devices at the front bottom of the machine and deflectors arranged between the paths of rearward and forward travel of the plates and inclined in an upward and rearward direction.

In witness whereof we have signed our names to the foregoing specification in the presence of two subscribing witnesses.

CHARLES WAGNER.
AUGUST HORMEL.

Witnesses:
JOSEPH F. O'BRIEN,
HELEN V. WHIDDEN.