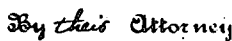


1,293,261.

5 SHEETS—SHEET 1.



Charles Wagner:  
August Hornel

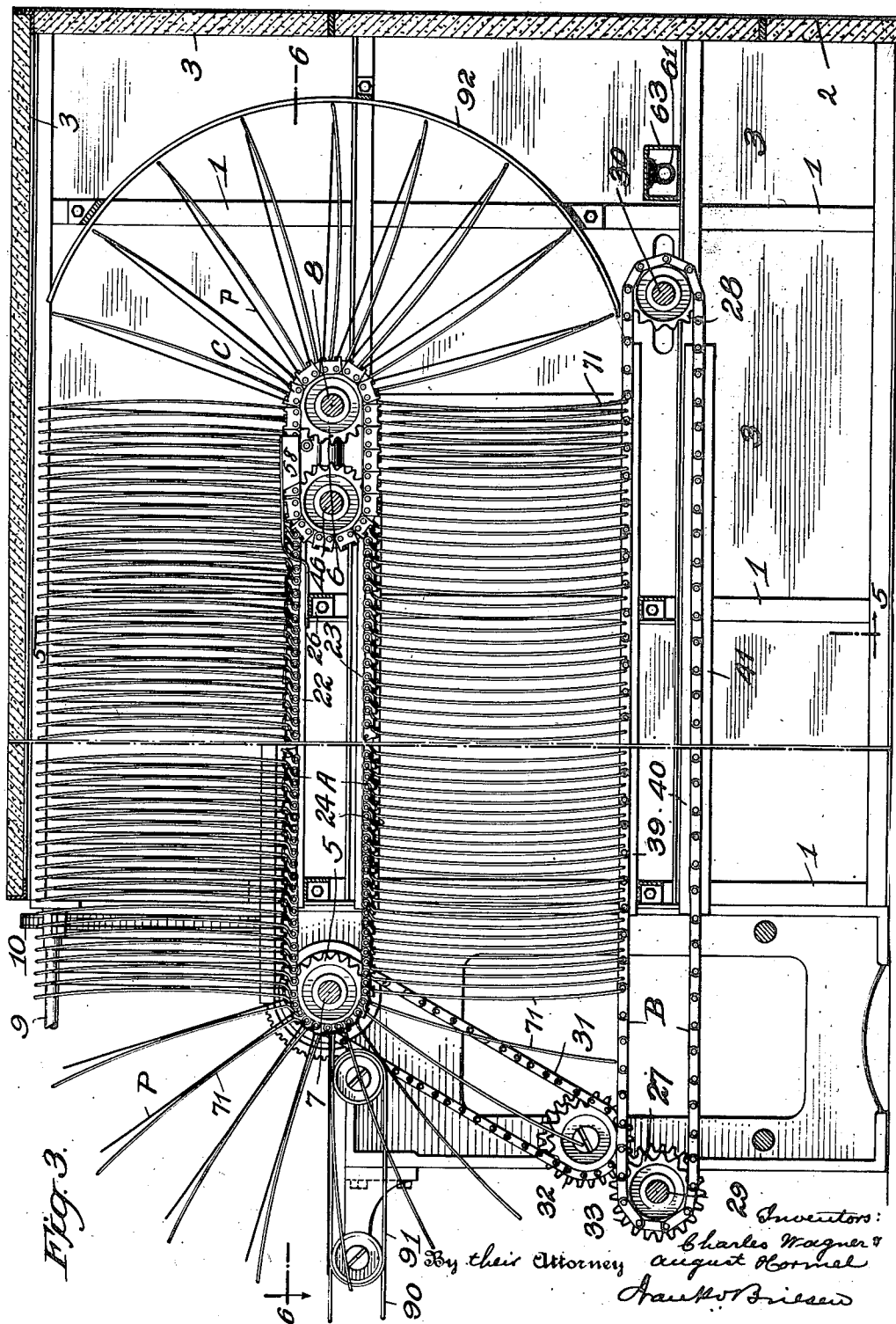
Paul R. Briesau

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 APPLICATION FILED SEPT. 14, 1918.

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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

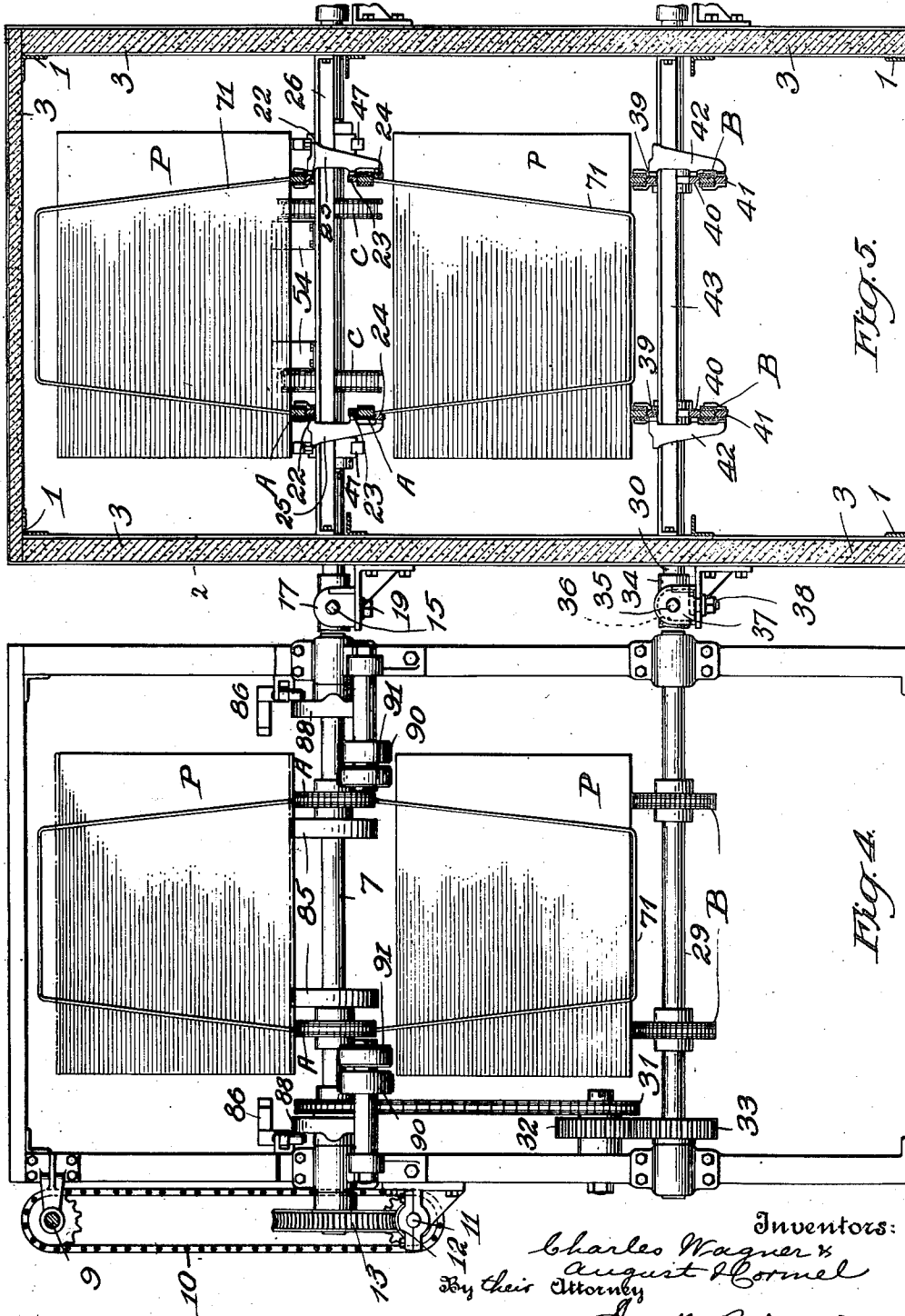


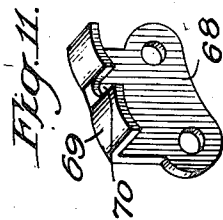
Fig. 5.

Fig. 4.

Inventors:  
 Charles Wagner &  
 August Hormel  
 By their Attorney  
 Auker & Sisson

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5 SHEETS—SHEET 4.



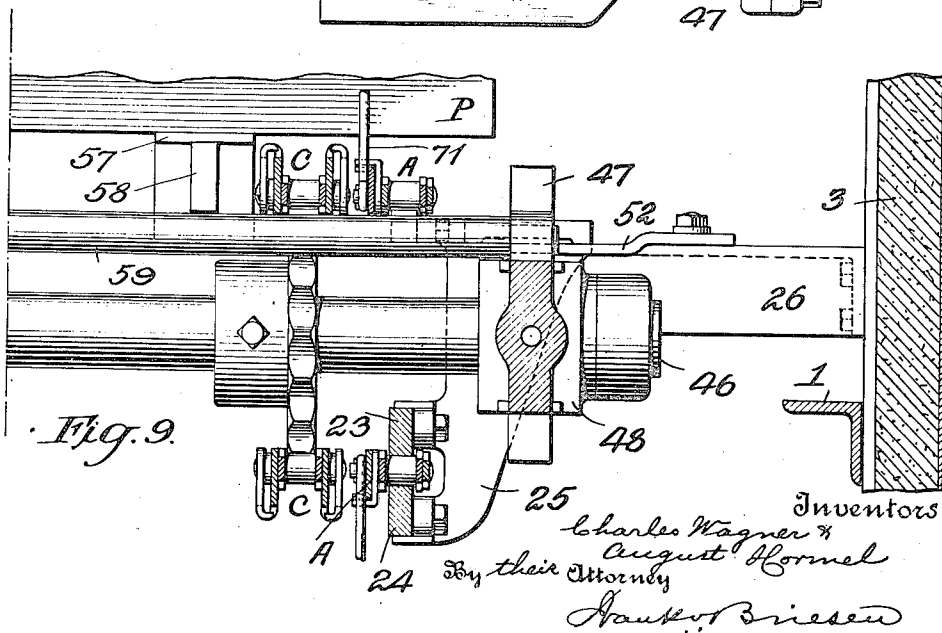
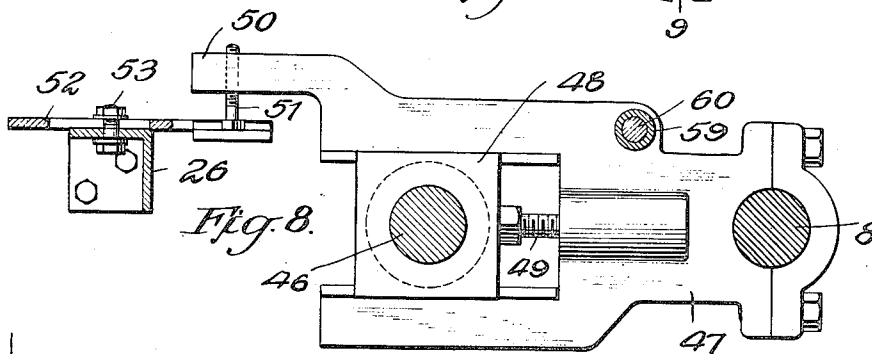
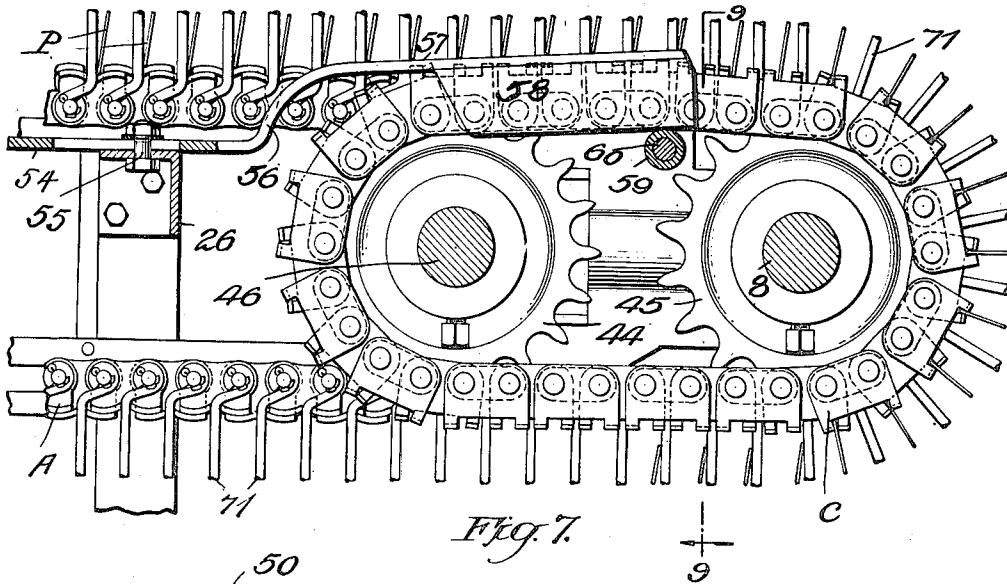
Inventors:  
Charles Wagner &  
August Hornel  
Frank Briesen

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5 SHEETS—SHEET 5.



Inventors:  
 Charles Wagner &  
 August Hormel  
 By their Attorney  
 Hank & Biesen

# UNITED STATES PATENT OFFICE.

CHARLES WAGNER, OF GRANTWOOD, NEW JERSEY, AND AUGUST HORMEL, OF  
NEW YORK, N. Y.

## DRYING APPARATUS FOR SHEET-METAL PLATES.

1,293,261.

Specification of Letters Patent.

Patented Feb. 4, 1919.

Application filed September 14, 1918. Serial No. 254,149.

*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 New York city, in the county and State of New York, have invented certain new and useful Improvements in Drying Apparatus for Sheet-Metal Plates, of which the following is a specification.

This invention relates to an apparatus of novel construction, more particularly adapted to dry the print on tin plates, such as are used in the manufacture of sheet metal cans, bottle caps and various other articles of merchandise. The apparatus is intended to be used in conjunction with the press which prints such plates, and should be operatively connected thereto in such a manner, that after a plate is printed it is automatically conveyed to and carried through the apparatus so that it is delivered from the latter, ready for the market.

The invention consists in the various features of novelty more fully pointed out in the specification and appended claims.

In the accompanying drawings:—

Figure 1 is a side elevation of an apparatus embodying our invention;

Fig. 2, a horizontal section on line 2—2 of Fig. 1;

Fig. 3, an enlarged vertical section of both ends of the apparatus, on line 3—3 of Fig. 6;

Fig. 4, a left hand end elevation;

Fig. 5, a section on line 5—5 of Fig. 3;

Fig. 6, an enlarged sectional plan, along line 6—6 of Fig. 3;

Fig. 7, an enlarged section of upper conveyer and gripping chain, on line 7—7 of Fig. 6;

Fig. 8, a section on line 8—8, of Fig. 6;

Fig. 9, a section on line 9—9 of Fig. 7;

Fig. 10, a plan of the gage;

Fig. 11, a detail of one of the flanged links of the upper conveyer chain;

Fig. 12, a detail of one of the outer gripping links of the gripping chain;

Fig. 13, a detail of one of the inner gripping links of said chain;

Fig. 14, a plan of the conveyer chain;

Fig. 15, a section on line 15—15 of Fig. 14;

Fig. 16, an elevation of the conveyer chain;

Fig. 17, a plan of the gripping chain;  
Fig. 18, a cross section thereof on line 18—18 Fig. 17, and

Fig. 19, an elevation thereof.

The apparatus comprises an elongated casing formed of a metal frame 1, a sheet iron covering 2, and an asbestos lining 3, which constitutes a poor heat conductor. The casing is closed on top, on two sides and at one end, while it is open at the other end. This open end is adapted to receive the wet tin plates P, while the dried plates are delivered through openings 4 formed in the sides of the casing in proximity to such open end.

Within the casing are mounted two upper parallel endless conveyer chains A and two lower parallel endless conveyer chains B. Chains A turn on sprocket wheels 5 and 6, fast on shafts 7 and 8 respectively. Of these, shaft 7 receives motion in suitable manner from a power shaft 9 which is so driven from the printing press that during the printing of each plate, the chains are advanced for a distance necessary for the reception of such plate. As shown, shaft 9, by chain drive 10, shaft 11 and worm 12, drives worm wheel 13 fast on shaft 7. Shaft 8 is mounted in such a manner that the tension of chains A may be readily changed. To this effect, the shaft is mounted in slidable bearings 14, engaged by set screws 15 that are tapped into nuts 16 resting against perforated abutments 17. After the bearings have been adjusted, they are locked in position by nuts 18, threaded on studs 19 that depend from the bearings and pass through slots 20 of brackets 21, which are affixed to the walls of the casing.

Chains A are supported intermediate shafts 7 and 8, by longitudinal rails 22, 23, 24 of which rails 22 are located underneath the upper chain runs, while rails 23, 24 are located respectively above and below the lower chain runs. The rails are carried by brackets 25, affixed to beams 26 that extend across the casing.

The lower chains B engage sprocket wheels 27, 28, fast respectively on shafts 29, 30, of which shaft 30 should be located a distance beyond the corresponding shaft 8 of the upper chains A. Shaft 29 receives motion from shaft 7 by chain drive 31 and gear wheels 32, 33 of which wheel 33 is mounted on shaft 29, both chains being driven with like

speed but in opposite directions. Shaft 30 is adjustably mounted similar to shaft 8, for the purpose of setting the tension of chains B, the drawing showing the slidable bearings 34, set screws 35, nuts 36, abutments 37, and nuts 38. Chains B are also similar to chains A, guided on longitudinal rails 39, 40, 41, carried by brackets 42 which are mounted on transverse beams 43. Between the rear ends of chains A, is interposed a third pair of endless parallel chains C, which chains have for their object, to transfer the plates P from chains A, to chains B, at the rear turn of chains A, and to firmly grip such plates while such turning movement takes place. Chains C engage sprocket wheels 44, 45, mounted respectively on a shaft 46, and on the shaft 8 of upper chains A, so that the chains A, C maintain their correlation during all adjustments of shaft 8. The latter passes loosely through a pair of brackets 47, in which are slidably mounted the bearings 48 of shaft 46, such bearings being adjustable by set screws 49, so as to change the tension of chains C. Brackets 47 are tiltable on shaft 8, in order to slightly raise or lower shaft 46, and thereby alter the dip of chains C, so as to insure their proper coaction with chains A.

To effect this result, brackets 47 are provided with toes 50 into which are tapped, set screws 51, resting on elbow plates 52 which are adjustably secured to a cross beam 26, by means of bolts 53.

In order to raise plates P off chains A and deliver them to chains C, there are provided, a pair of rails 54 that extend a distance along the paralleling parts of such chains. These rails are adjustably connected by bolts 55 to beam 26, and are provided with upwardly inclined sections or risers 56 and with raised treads 57 beyond such risers. From the lower sides of treads 57, depend lugs 58 resting on a sleeve 59 that encompasses a shaft 60, mounted in brackets 47. Upon this sleeve rest, likewise, the upper runs of chains C so that during all adjustments of the brackets, the relative position of rails 54 and chains C is maintained.

Shaft 60 is hung at such an elevation above shaft 46 that an upward slope is imparted to rails 54, and also to the chains C for the purpose of raising treads 57 a distance above chains A and thus permitting plates P to drop from chains A upon chains C.

The casing may be heated in suitable manner. As shown, it is traversed by a multitude of perforated pipes 61 that constitute burners and receive gas from supply pipe 62. The burners pass through inverted U-shaped hoods 63, which effect a uniform diffusion of the heat.

The construction of chains A is more fully shown in Figs. 11, 14, 15 and 16. It consists of sleeves 64, mounted on bushings 65,

through which pass pivot pins 66, carrying connecting links 67. Pins 66 protrude at their inner ends a distance beyond links 67, and upon these protruding ends are mounted, an additional row of overlapping links 70 68, each of which is provided with a pair of perforations, for engagement with two adjoining pins. Link 68 is provided with an inwardly turned flange 69 having a centrally disposed notch 70, the two sections of the flange thus formed being curved with the axes of pins 66 as centers, so that the overlapping flange sections of adjoining links are concentric and permit the turning of the links around the sprocket wheels. Every pair of opposed notches 70, of the two chains A, engages the shanks of inverted U-shaped wire carriers 71 that are looped around pins 66 as at 72. The carriers bridge the space between the two chains and cause sheets P to be taken along by the latter.

Chain B is an ordinary link chain, and requires no further description.

Chain C is more fully shown in Figs. 12, 13, 17, 18 and 19. It is composed of a series of members, each of which is formed of sleeves 73 turning on bushings 74, which are mounted on pins 75. Adjoining pins are connected in pairs by links 76 to form one of the chain members. Pins 75 protrude beyond links 76 at both ends, and upon the protruding ends of each member are mounted a pair of gripping links 80, having a pair of outwardly deflected jaws 82, such links being apertured as at 81 for the reception of pins 75. Upon the adjoining pins of each adjoining member-pair are mounted additional gripping links 77 that overlap links 80 and are apertured as at 79 for the accommodation of the pins. Links 77 are provided with a pair of inwardly directed jaws 78 so that, owing to the overlapping arrangement of the links, each of the jaws 78 will be opposed to a cooperating jaw 82. While chain C is in a horizontal position, each pair of cooperating jaws will be spaced from each other to form gaps 83 for the reception of the lower edge of plate P, but when the chain makes a turn around its sprocket wheel, the jaws will close upon the plate, and carry it along with it, during the entire arc of the turn. When this turn ceases, and the chain resumes its horizontal position, the jaws will again open to release the plate, and drop it upon chains B. In order to increase the gripping effect or reach of the jaws 78, 82, spacing links 84 are interposed between links 77 and 80, said links 84 being mounted upon the pins 75 of adjoining chain members.

Upon shaft 7, is mounted, a pair of pulleys 85, against which the plates P abut, when introduced into the apparatus, and upon which they ride until they are made to assume a vertical position. In order to

center the plates when thus transferred to chains A, there are provided, a pair of gages 86 flanking the latter at the ingress end of the apparatus. These gages are fulcrumed at 87, and are oscillated by a cam 88 of shaft 7 against which they are held by a spring 89. Thus as the gages rock on their fulcrums, they will have a tendency to engage the ends of plates P and push them into a centered position.

Plates P are by the printing press, delivered to conveyer belts 90 which carry them to belts 91 that in turn push them between a pair of carriers 71 and against pulleys 85. The carriers, on rising, will turn the plates into an upright position and convey them by chains A, toward the rear end of the heated casing. When the plates encounter rails 54, they will be raised by their elevated treads 57, off chains A, and dropped into the open gaps 83 formed by the jaws 78, 82 of chains C. As the latter make the turn around their sprocket wheels 45, the jaws will close upon the plates, so as to grip and hold them until the turn is completed, after which the jaws will open, so as to drop the plates on lower chains B. Should any one of the plates be missed by the grippers, it will be taken around the turn by carriers 71, a dropping of the plates, during this movement, being prevented by a curved shield 92 arranged concentric to shaft 8. Chains B will carry the plates back toward the front of the drier, during which travel, they are properly spaced and held in an upright position, by the carriers 71 that depend from the lower runs of chains A, and move in the same direction as the upper run of chains B. When the plates arrive opposite openings 4, they will be thoroughly dried and in condition for removal.

It will be seen that during the travel of the plates through the drier, they will be sustained in position and spaced from each other by the wire carriers 71, which thus prevent the paint from rubbing off. By using separate upper and lower conveyer chains, and intermediate gripping chains, overloading of any one chain system is effectively overcome, which is a matter of importance for the reason that the tin plates are collectively of considerable weight, which would be apt to quickly wear or break the chains, when overburdened. The apparatus operates automatically, and when timed to work in unison with the printing press, will effect a delivery of the printed and dried sheets ready for the market.

We claim:

1. In a drying apparatus for metal plates, an upper endless conveyer, a lower endless conveyer, said conveyers being adapted to directly support said plates, means for moving said conveyers synchronously in opposite directions, means for transferring said

plates from the upper conveyer to the lower conveyer, and a plurality of carriers mounted on the upper conveyer and adapted to project from the lower run thereof, toward the upper run of the lower conveyer.

2. In a drying apparatus for metal plates, an upper endless conveyer, a lower endless conveyer, said conveyers being adapted to directly support said plates, means for moving said conveyers synchronously in opposite directions, a chain having a plurality of grippers and adapted to transfer said plates from the upper conveyer to the lower conveyer, and a plurality of carriers mounted on the upper conveyer and adapted to project from the lower run thereof toward the upper run of the lower conveyer.

3. In a drying apparatus for metal plates, an upper conveyer, a lower conveyer arranged a distance below the upper conveyer, said conveyers being adapted to directly support said plates, a sprocket wheel, a chain having a turn on said wheel and adapted to transfer said plates from the upper conveyer to the lower conveyer, and jaws on said chain which are adapted to automatically close upon said plates at said turn.

4. In a drying apparatus for metal plates, an upper conveyer, a lower conveyer arranged a distance below the upper conveyer, said conveyers being adapted to directly support said plates, a sprocket wheel, a chain having a turn on said wheel and adapted to transfer said plates from the upper conveyer to the lower conveyer, jaws on said chain which are adapted to automatically close upon said plates at said turn, and a plurality of carriers mounted on the upper conveyer and adapted to project from the lower run thereof toward the upper run of the lower conveyer.

5. In a drying apparatus for metal plates, a pair of parallel conveyer chains having sleeves, pins passing through said sleeves and protruding therefrom, links connecting the pins, additional overlapping notched links likewise mounted on the pins, and inverted U-shaped carriers that are engaged by said notched links.

6. In a drying apparatus for metal plates, a pair of parallel conveyer chains having sleeves, pins passing through said sleeves and protruding therefrom, links mounted on the protruding ends of the pins, said links being provided with overlapping concentric flanges, and with notches intermediate said flanges, and inverted U-shaped carriers passing through said notches and looped around the pins.

7. In a drying apparatus for metal plates, a pair of parallel conveyer chains having sleeves, pins passing through said sleeves and protruding therefrom, links connecting the pins, additional links mounted on the pins, said last named links being provided

with overlapping concentric flanges and with notches intermediate said flanges, and inverted U-shaped carriers passing through said notches and looped around said pins.

5 8. In a drying apparatus for metal plates, an upper conveyer chain, a lower conveyer chain, a gripping chain adapted to transfer said plates from the upper conveyer chain to the lower conveyer chain, said gripping  
10 chain describing a curved path, and means for raising said plates from said upper conveyer chain into engagement with said gripping chain.

9. In a drying apparatus for metal plates,  
15 a pair of conveyer chains, a pair of gripping chains arranged sidewise of said conveyer chains, and a pair of rails having risers and elevated treads, said rails extending alongside said conveyer chains and gripping  
20 chains.

10. In a drying apparatus for metal plates, a pair of conveyer chains, a pair of gripping chains, a shaft, sprocket wheels on said shaft that are engaged by said chains,  
25 brackets tiltable on the shaft, bearings adjustably mounted in said brackets, a second shaft hung in said bearings, and sprocket wheels mounted on said second shaft and likewise engaged by the gripping chains.

30 11. In a drying apparatus for metal plates, a shaft, a pair of brackets mounted thereon, means for tilting said brackets, a rail having a riser, a support on said brackets that is operatively engaged by said rail,  
35 a conveyer chain, and a gripping chain, said rails extending alongside said chains.

12. In a drying apparatus for metal plates, a shaft, a pair of brackets mounted thereon, means for tilting said brackets, a  
40 rail having a riser, a conveyer chain, a gripping chain, and a support on said brackets that is engaged by said rail and said gripping chain.

13. In a drying apparatus for metal  
45 plates, a shaft, sprocket wheels mounted thereon, a conveyer chain and a gripping chain engaging said sprocket wheels, a pair of brackets mounted on the shaft, bearings mounted in the brackets, a second shaft  
50 hung in said bearings, sprocket wheels on said second shaft and likewise engaged by the gripping chain, a rail having a riser, and a support on said brackets that is engaged by said rail and said gripping chain.

55 14. In a drying apparatus for metal

plates, an endless gripping chain, provided with a first series of links, a second series of links that overlap the first named links, and opposed jaws on said first and second series of links.

15. In a drying apparatus for metal plates, an endless gripping chain provided with a first series of links, a second series of links that overlap the first named links, the links being provided with opposed jaws, and  
65 spacing links interposed between the first and second series of links.

16. In a drying apparatus for metal plates, a pair of endless upper conveyer chains having notched flanges, a plurality  
70 of carriers engaging said flanges, a pair of endless gripping chains having jawed links and extending partly along the conveyer chains, a pair of lower conveyer chains, and means for moving the upper and lower conveyer chains in opposite directions.

17. In a drying apparatus for metal plates, a pair of endless conveyer chains having notched flanges, a plurality of carriers engaging said flanges, a pair of endless  
80 gripping chains having jawed links and extending partly along the conveyer chains, and a pair of rails having risers and extending along the conveyer chains and the gripping chains.

18. In a drying apparatus for metal plates, a pair of endless upper conveyer chains having notched flanges, a plurality of carriers engaging said flanges, a pair of endless lower conveyer chains, means for  
90 moving said upper and lower chains in opposite directions, and a pair of endless gripping chains having opposed jaws and interposed between the rear ends of the upper and lower conveyer chains.

19. In a drying apparatus for metal plates, a pair of endless upper conveyer chains having notched flanges, a plurality of carriers engaging said flanges, a pair of endless lower conveyer chains, means for  
100 moving said upper and lower chains in opposite directions, a pair of endless gripping chains having opposed jaws and interposed between the rear ends of the upper and lower conveyer chains, and a pair of rails  
105 having risers and extending along the upper conveyer chains and the gripping chains.

CHARLES WAGNER.  
AUGUST HORMEL.