L. C. STEELE.

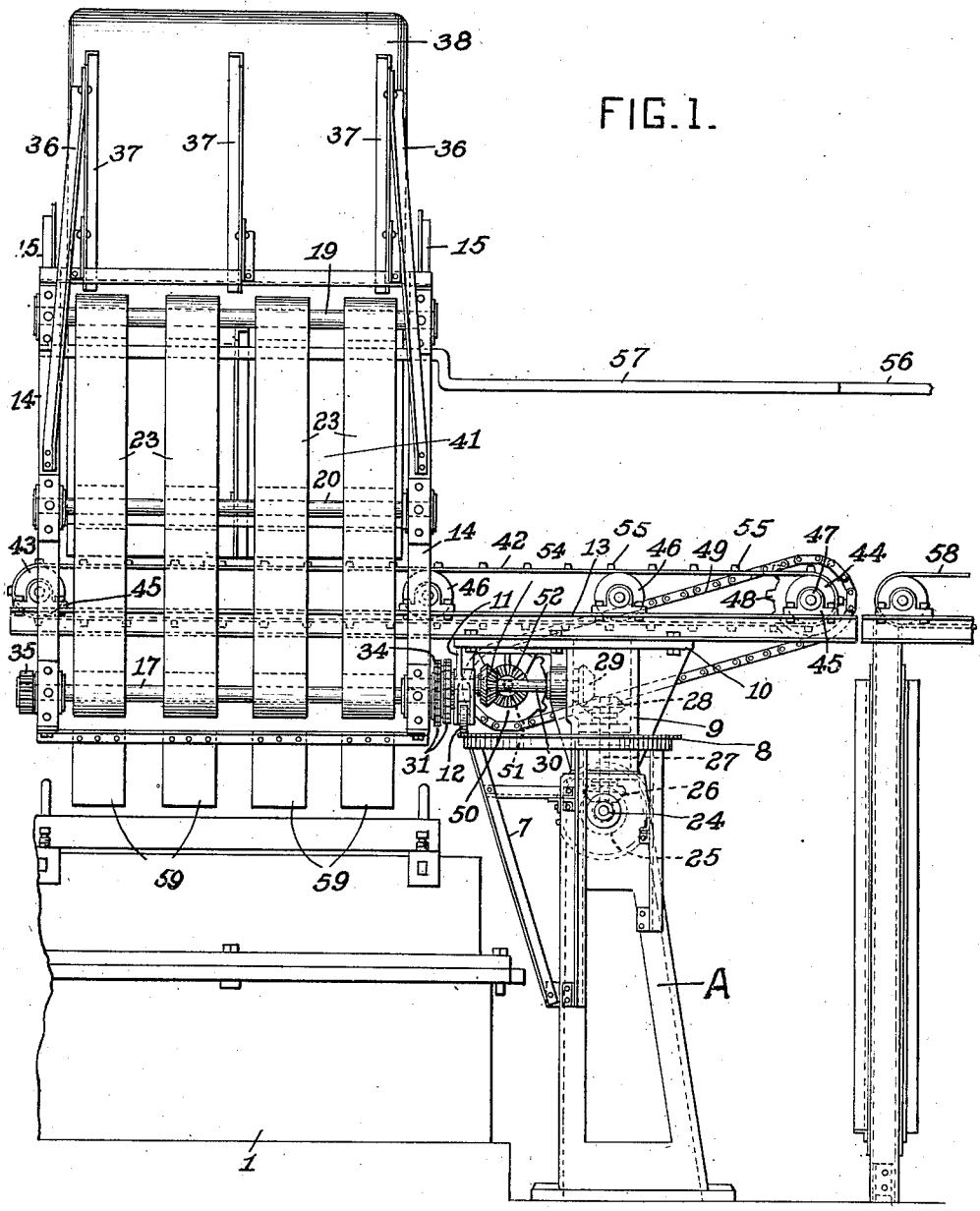
APPARATUS FOR CATCHING, CONVEYING, AND COOLING COATED METAL SHEETS.

APPLICATION FILED FEB. 25, 1910.

997,869. Patented July 11, 1911.

4 SHEETS—SHEET 1.

FIG. 1.



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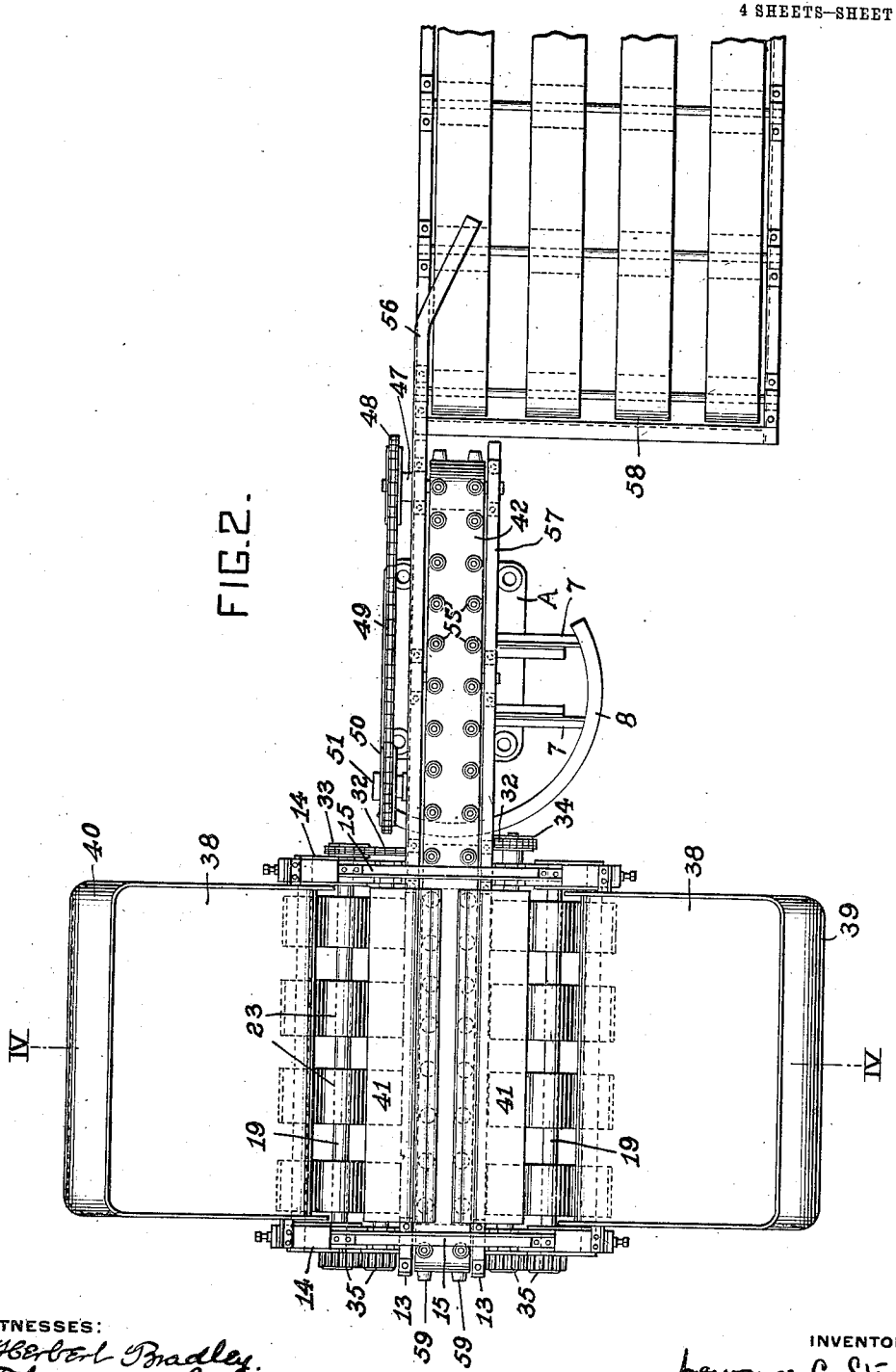
4 SHEETS—SHEET 2.

FIG. 2.



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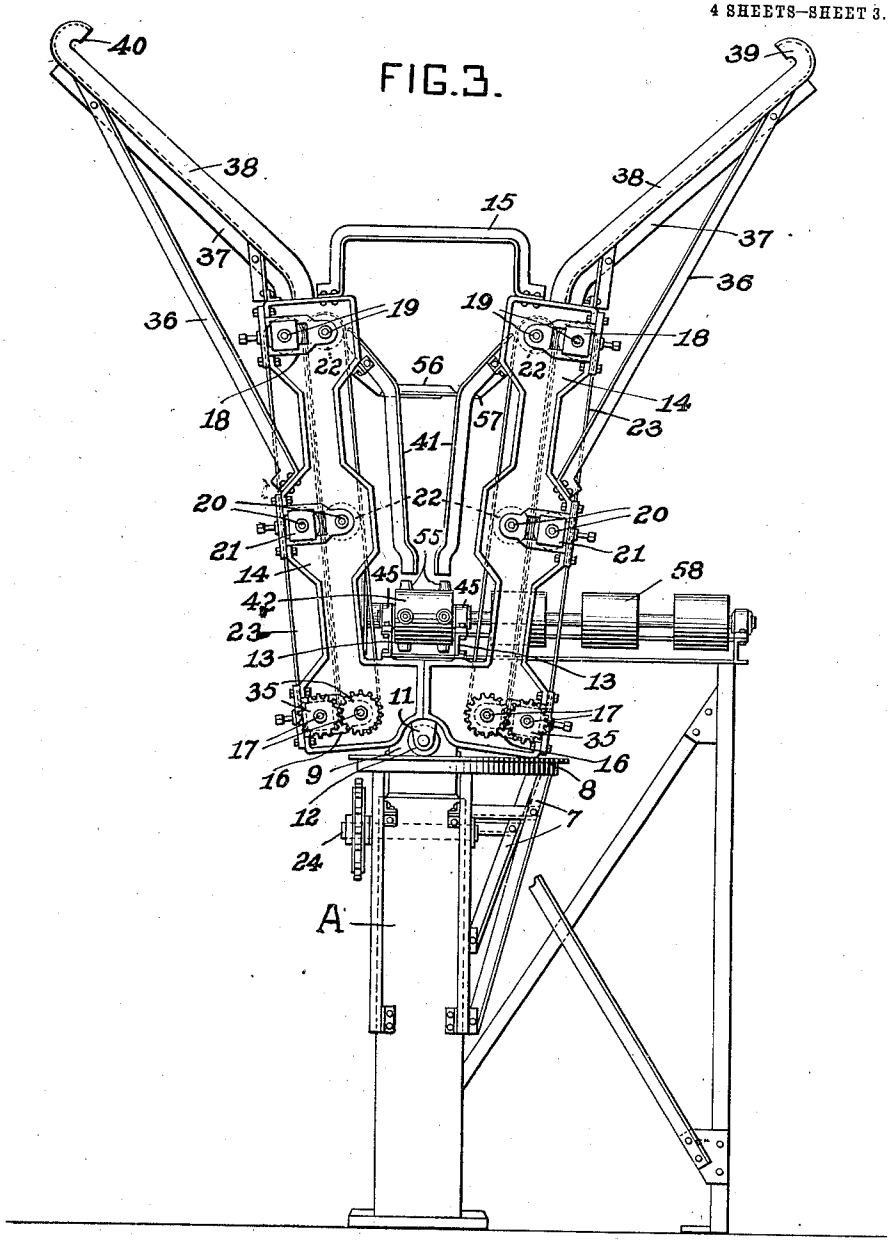
4 SHEETS—SHEET 3.

FIG. 3.



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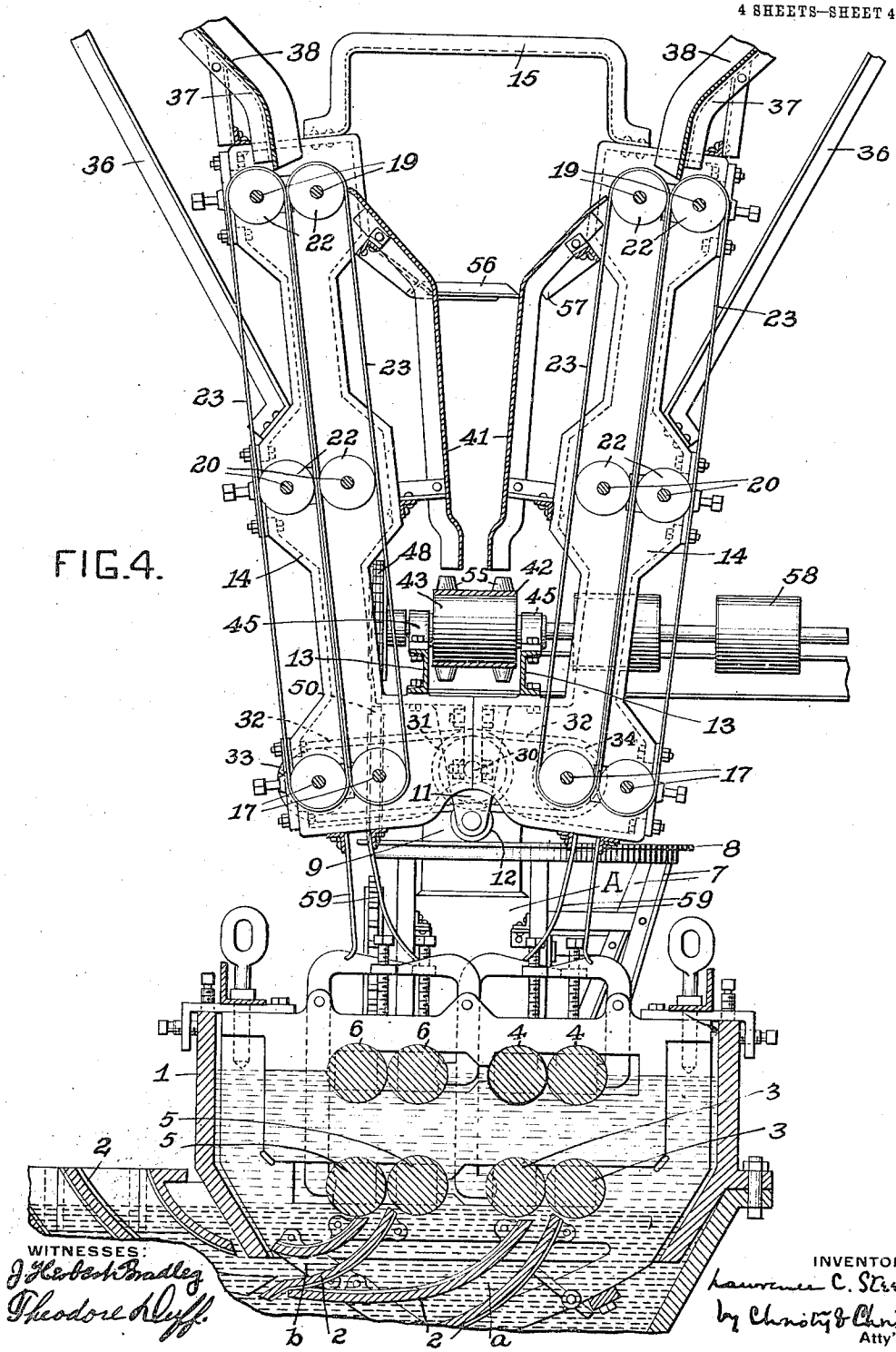
4 SHEETS—SHEET 4.

FIG. 4.



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UNITED STATES PATENT OFFICE.

LAWRENCE CARR STEELE, OF BEAVER, PENNSYLVANIA.

APPARATUS FOR CATCHING, CONVEYING, AND COOLING COATED METAL SHEETS.

997,869. Specification of Letters Patent. Patented July 11, 1911.

Application filed February 25, 1910. Serial No. 545,917.

To all whom it may concern:

Be it known that I, LAWRENCE CARR STEELE, residing at Beaver, in the county of Beaver and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Apparatus for Catching, Conveying, and Cooling Coated Metal Sheets, of which improvements the following is a specification.

It is the object of the invention to provide means for catching the sheets as they issue from the coating-bath, and by means which will not mar the coated surfaces to transfer them to suitable supports and conveyers, whereon they may be so supported as to cool evenly and without warping or distortion.

It is a further object to provide mechanism for handling the sheets which shall be of simple construction, and will carry them away expeditiously as they issue from the coating-bath. And it is a further object to so arrange the mechanism in proximity to the coating-bath, that it may easily be removed when access to the bath, and the mechanism accessory thereto, is desired.

In the accompanying drawings, forming part of this specification, the invention is illustrated as embodied in a machine for catching, conveying and cooling tinned sheets or plates of iron or steel, commonly known as "tin-plate."

Figure 1 is a side elevation of the machine. Fig. 2 is a top plan view. Fig. 3 is an end elevation. Fig. 4 is a vertical section on an enlarged scale on the line IV—IV of Fig. 2.

The coating-tank 1 may be of any suitable form, but preferably of the duplex form shown, and in it are arranged the guides 2 for the sheets. In Fig. 4 portions of these guides are shown as shiftable by mechanism which is only generally indicated, since it is well known in the art, for directing the sheets alternately through the passages *a* and *b*. From said passages the sheets alternately issue into and are drawn away by the sets of rollers 3, 3, 4, 4, 5, 5, and 6, 6, which constitute the feeding-out mechanism, and which are driven by suitable mechanism, not shown. The lower sets of rollers 3, 3 and 5, 5 may be partially immersed in the oil which is commonly employed on the surface of the tinning bath.

Adjacent to the coating-tank 1 is arranged the standard A, upon which on the side next to the tank, is supported by beams 7 the arc-shaped track 8. Rotatably mounted upon the upper portion of the standard is the head 9, having the platform 10. Depending from the platform on the side next the tank is a hanger 11, carrying the wheel 12 which rests upon the track 8. Bolted upon the platform and extending over the coating-tank are a pair of longitudinal beams 13, which together constitute a swinging arm or support for the mechanism hereinafter described.

Secured to the beams 13 at points above the opposite ends of the coating-tank are the frames 14. These frames project below the beams to a proper distance above the rollers 4, 4 and 6, 6, respectively, as hereinafter indicated, and thence extend upwardly at angles diverging slightly from the vertical. To the tops of the opposite frames at the opposite ends of the tank are secured the spacing-bars 15. In the lower portions of each pair of frames on opposite sides of the machine are secured the bearings 16 for the adjacent pairs of drum-shafts 17 extending longitudinally between the frames on each side. At the tops of the frames on each side are similarly mounted in bearings 18 the adjacent drum-shafts 19. Within the frames between the said pairs of shafts 17 and 19, and in line therewith, additional pairs of adjacent drum-shafts may be employed in such number as considered desirable or necessary, one such pair 20, in bearings 21, being shown on each side. The lower inner portions of the frames 14 preferably extend inwardly beneath the beams 13, where they abut against each other and are bolted together, as shown in Figs. 3 and 4.

The series of drum-shafts 17, 20 and 19 on each side of the machine have fastened thereto at equal intervals the drums 22, which are of such diameter that the drums on adjacent pairs of shafts shall have a space between them only sufficient to allow the drums and the traveling belts or aprons 23 mounted thereon to draw the sheets through between them with a firm grip. Said belts 23 are made of fibrous material, such as felt or canvas, so as not to mar the hot tinned surfaces of the sheets, and are carried on the alining drums on the adjacent series of shafts on opposite sides of the machine.

24 indicates the main shaft of the machine, mounted in bearings in the standard A, and which is driven from any suitable

source of power. Fastened thereto is a bevel-pinion 25 meshing with a bevel-pinion 26 on the lower end of vertical shaft 27. On the upper end of shaft 27 is a bevel-pinion 28, meshing with bevel-pinion 29 on the longitudinal shaft 30. On the opposite end of said shaft 30, in the transverse line of the inner ends of the drum-shafts 17, are mounted a pair of sprocket-wheels 31. From said sprocket-wheels respectively chains 32 extend, one to a sprocket-wheel 33 on the end of the outer drum-shaft 17 on one side of the machine, and the other to a sprocket-wheel 34 on the end of the inner drum-shaft 17 on the other side. At their opposite ends the pairs of drum-shafts 17 are provided with intermeshing pinions 35. Thus through the described connections the shafts 17 are so driven as to cause their respective belts on each side of the machine to move upwardly in juxtaposition between and from the drums on shafts 17, to and between the drums on shafts 20 and 19 in succession.

At the tops of the frames 14 on opposite sides are secured and supported, by bars and angles 36 and 37, the outwardly inclined sheet-metal supports 38, preferably having their edges and outer ends turned up, as indicated at 39 and 40, to properly guide the coated sheets.

Secured to the inner sides of the frames 14 are the depending aprons 41, which are preferably made continuous between the frames on each side, being inclined at the top in approximate projection of the inclined supports 38, and opening at the bottom upon the face of the longitudinally traveling belt 42. The belt 42 is mounted upon drums 43 and 44 having their journals supported in bearings 45 on the opposite ends of the beams 13, intermediate drums 46 being also preferably provided as shown. The journal 47 of drum 44 is provided with a sprocket-wheel 48, driven by means of a chain 49, from sprocket-wheel 50 on countershaft 51, the latter having a bevel-pinion 52 meshing with a bevel-pinion 54 on the longitudinal shaft 30, which as has already been seen is operatively connected with and driven by the main shaft 24 of the machine. The belt 42 is preferably provided with marginal knobs 55 as shown.

Projecting from the inner ends of opposite frames 14 are the guiding-rails 56 and 57, at a suitable height above the surface of the belt 42 to support the plates on their edges thereon. Adjacent to the ends of beams 13 at the end of the travel of belt 42 is the conveyer 58, which may be of any suitable form, though preferably made up of a series of traveling belts as shown. In a tin-plate plant this conveyer may lead to the "branning" machine. The rail 56 is carried on above the edge of conveyer 58, and is bent inwardly over the body of the conveyer as shown, while the rail 57 terminates at about the end of the beams 13. A conveyer is generally indicated as the place of deposit of the cooled sheets, though any other suitable or desired resting-place for the sheets may be used without departure from the invention.

In the embodiment of the invention herein illustrated and described, the driving mechanism and connections should be so proportioned and operated, that the drums on shafts 17, and the belts 23, shall travel at the same speed as the rollers 3, 3, 4, 4, 5, 5 and 6. 6 of the coating-tank, and said shafts 17 should be arranged sufficiently near to the rollers 4, 4 and 6, 6, that the drums and belts thereon will grip the advance end of each sheet before its opposite ends has left said rollers 4, 4 or 6, 6. Guides of any suitable form, as indicated at 59, may be provided for the sheets. The drum 44 and belt 42 should be caused to travel at a speed materially higher than that of belts 23, in order to insure that the travel of the sheets through the machine shall not be impeded or interfered with by sheets in advance.

In operation, assuming a sheet issuing from the passage *a* in the coating-tank 1, it is engaged by the pairs of rollers 3, 3 and 4, 4 in succession, and fed upwardly into the pass between the belts 23 at the right-hand side of the machine, Figs. 3 and 4. It is then drawn upwardly between said belts and fed therefrom at the top upon the inclined support 38. From the support 38 the sheet immediately slides down between the aprons 41, until its edge rests upon the belt 42. It is thus carried, supported on its edge first by said aprons 41 and then by the rails 56 and 57, to the exit end of the machine, where the bent outwardly extending end of the rail 56 causes it to turn over on its face upon the conveyer 58, by which it may be carried to the "branning" machine, or any desired place of deposit. Since the belt 42 is flexible the fall of the plates thereon is cushioned, and their edges are not marred or otherwise injured. Meanwhile the next succeeding sheet has passed through the passage *b* and rollers 5, 5 and 6, 6, whence it has been delivered to and caught between the belts 23 on the left-hand side of the machine, and it is then in like manner delivered from that side edgewise upon the belt 42.

By thus arranging two sets of cooperating conveyers in connection with two delivery passages from the coating-tank, and feeding the sheets through the respective passages and conveyers in alternation, the handling of the sheets is accomplished expeditiously and without interference between successive sheets. And by arranging said sets of conveyers to automatically deposit the sheets all upon a common conveyer operated at a higher speed, the entire output

of a duplex coating-tank may be deposited at a single point without at all necessitating the retarding of the passage of sheets therethrough.

By the employment of the coöperating fibrous conveying belts 23, the faces of the coated sheets are not marred, while they are gripped with the requisite firmness, and evenly supported.

It is of course understood that the pairs of coöperating drum-shafts 17, 20 and 19 should be arranged a distance apart less than the length of the sheets to be handled.

The belt 42 and the rails 56 and 57 may extend for any desired distance beyond the exit ends of the aprons 41, so that the opposite faces of the sheets will be entirely exposed to the atmosphere, and they will be cooled effectually and uniformly, and without warping or distortion.

I claim herein as my invention:

1. A conveyer for coated metal plates having in combination a pair of traveling fibrous aprons arranged to bear upon the opposite faces of the plates, means for driving said traveling aprons, and means for causing the plates to travel with said traveling aprons.

2. The combination with a coating-tank for metal plates, a pair of upwardly extending conveyers, and means for operating the conveyers, of a bed for the plates arranged between and beneath the upper terminals of said conveyers, and means for directing the plates from said terminals to and upon said bed.

3. The combination with a coating-tank for metal plates, of two feeding-out devices arranged side by side, means above each of said feeding-out devices for conveying the plates upwardly therefrom, a single traveling conveyer and means for driving it, and means for directing the plates from said upwardly conveying means to and upon said conveyer.

4. The combination with a coating-tank for metal plates, two feeding-out devices arranged side by side, a pair of upwardly extending conveyers, one above each feeding-out device, and means for operating said conveyers, of a horizontal conveyer arranged between and beneath the upper terminals of said upwardly extending conveyers, means for directing the plates from said upper terminals to and upon said horizontal conveyer, and means for operating said horizontal conveyer.

5. The combination with a pair of oppositely arranged upwardly extending conveyers for metal plates, and means for operating said conveyers, of a third horizontal conveyer arranged between and beneath the upper terminals of said upwardly extending conveyers, means for directing the plates edgewise from said upper terminals to and upon said third conveyer, means for supporting the plates on their edges thereon, and means for operating said third conveyer.

6. The combination with a pair of oppositely arranged upwardly extending conveyers for metal plates, and means for operating said conveyers, of a third horizontal conveyer arranged between and beneath the upper terminals of said upwardly extending conveyers, means for directing the plates edgewise from said upper terminals to and upon said third conveyer, abutments for the edges of the plates and means for supporting the plates on their edges thereon, and means for operating said third conveyer.

7. In an apparatus for handling heated flexible metal plates, the combination with a traveling conveyer having a bearing surface for the edges of the plates, and means for operating said conveyer, of means arranged at a suitable height above the conveyer for supporting the plates in substantially upright position thereon.

8. In an apparatus for handling heated flexible metal plates, the combination with a traveling conveyer having a bearing surface for the edges of the plates, and means for operating said conveyer, of oppositely arranged abutments on the conveyer for the edges of the plates, and means arranged at a suitable height above the conveyer for supporting the plates in substantially upright position thereon.

9. In combination with a conveyer for heated metal plates, and means for operating said conveyer, of an open railing arranged on each side of said conveyer for supporting the plates thereon in substantially upright position, whereby both faces of the plates are exposed to the atmosphere while traveling on said conveyer.

10. The combination with a coating tank for metal plates, and means for feeding the plates from the tank, of a horizontally swinging arm pivotally mounted adjacent to the tank and projecting thereover, and mechanism carried by the arm for receiving and conveying the plates.

11. The combination with a coating-tank for metal plates, of a support adjacent thereto, a horizontally swinging arm pivotally mounted upon the support and projecting over the tank, and a conveyer carried by the arm for receiving the plates from the tank.

12. The combination with a coating-tank for metal plates, a support adjacent thereto, and a horizontally swinging arm pivotally mounted upon the support and projecting over the tank, of a conveyer and means for driving it carried by said arm, a main driving-shaft, and a pivotal driving connection between said main driving-shaft and said conveyer-driving means.

13. The combination with a coating-tank

for metal plates, a support adjacent thereto, a main driving-shaft mounted upon the support, and an arm pivotally mounted on the support and projecting over the tank, of an upwardly extending conveyer and a horizontally extending conveyer both carried by the arm, means also carried by the arm for driving the conveyers, and a pivotal driving connection between said main driving-shaft and said conveyer-driving means.

14. The combination with a coating-tank for metal plates, a support adjacent thereto, a main driving-shaft mounted on the support, and an arm pivotally mounted on the support and projecting over the tank, of a pair of oppositely arranged upwardly extending conveyers and a horizontal conveyer carried by the arm, said horizontal conveyer being arranged between said upwardly extending conveyers and beneath their upper ends, a countershaft carried by the arm and connected to the conveyers, and a pivotal driving connection between the countershaft and the main driving-shaft.

15. In apparatus for conveying metal plates, a pair of oppositely arranged vertical conveyers, a horizontal conveyer arranged between and beneath the upper ends of said vertical conveyers, means for directing the plates from the upper ends of said vertical conveyers to and upon said horizontal conveyer, means for driving said vertical conveyers at a uniform speed, and means for driving said horizontal conveyer at a higher speed.

16. In an apparatus for handling heated flexible metal plates, the combination with a flexible traveling conveyer and means for operating the conveyer, of means for depositing the plates upon their edges upon said conveyer, and means arranged at a suitable height above said conveyer for supporting the plates in substantially upright position thereon.

In testimony whereof, I have hereunto set my hand.

LAWRENCE CARR STEELE.

Witnesses:

ALICE A. TRILL,

J. HERBERT BRADLEY.