March 25, 1941. H. M. BRAUCHER 2,235,978

CONTINUOUS STRIP COATING MACHINE

Filed Jan. 30, 1939 3 Sheets-Sheet 1

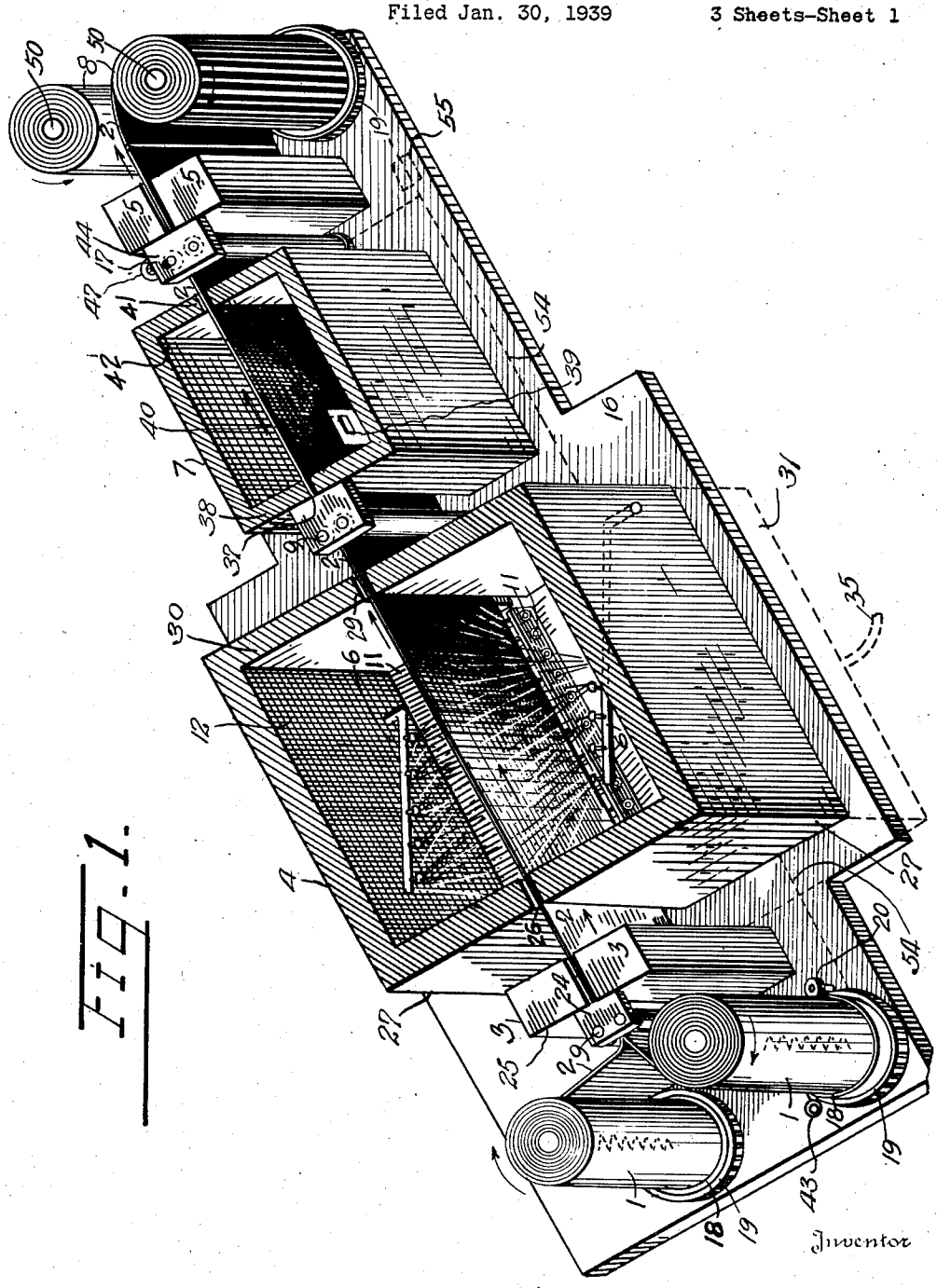


Fig. 1.

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CONTINUOUS STRIP COATING MACHINE

Filed Jan. 30, 1939 3 Sheets-Sheet 2

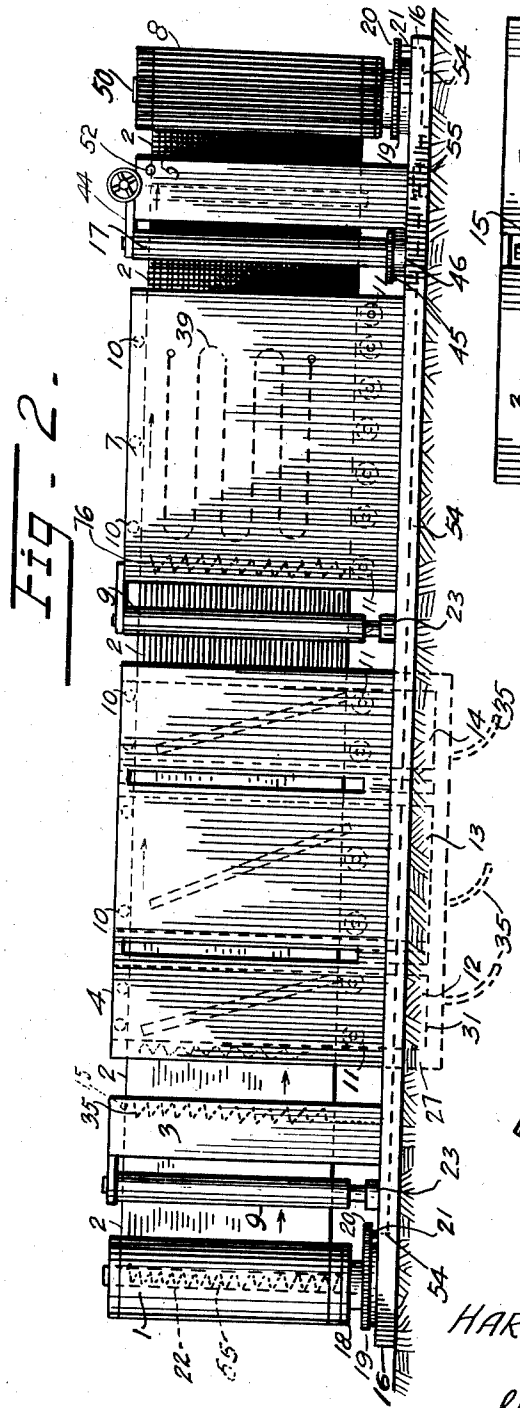


Fig. 2.

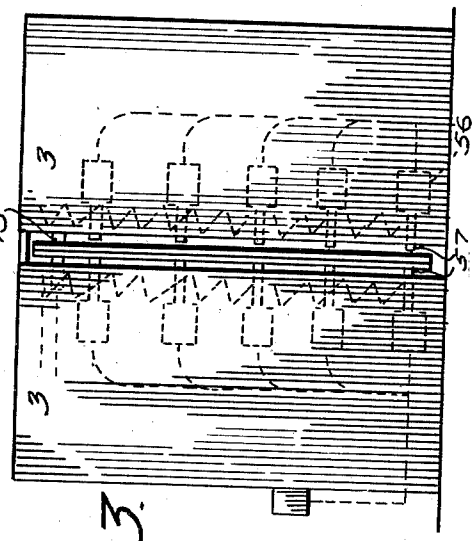


Fig. 3.

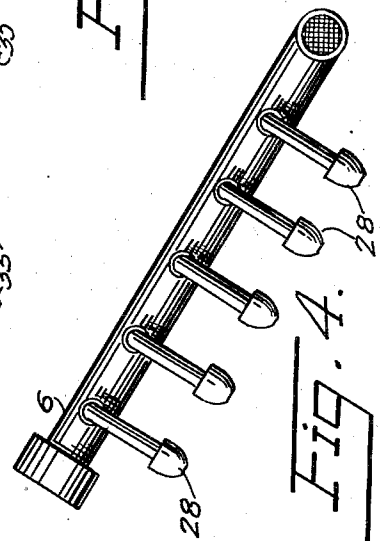


Fig. 4.

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CONTINUOUS STRIP COATING MACHINE

Filed Jan. 30, 1939 3 Sheets-Sheet 3

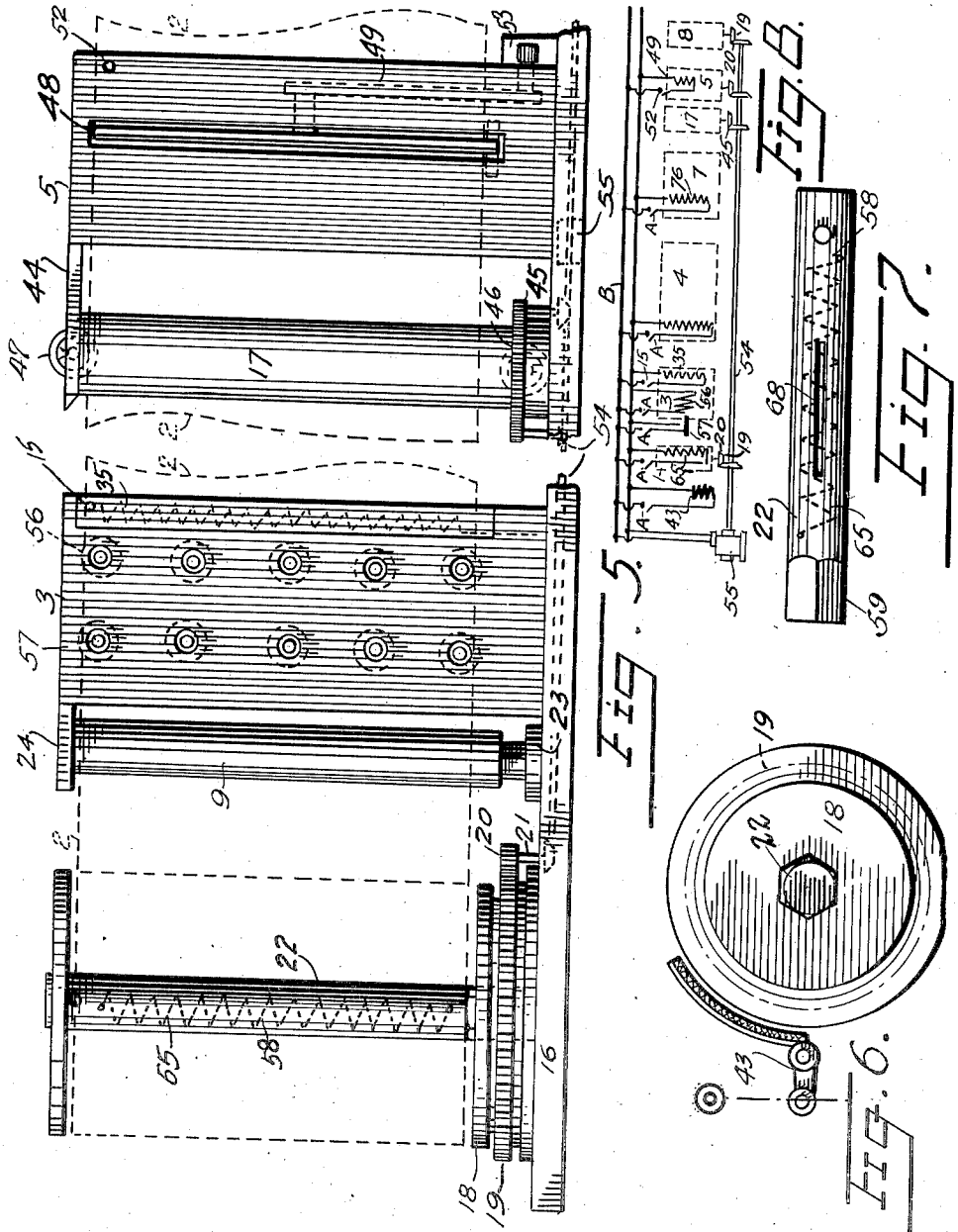


Fig. 5.

Fig. 7.

Fig. 6.

Fig. 8.

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Patented Mar. 25, 1941 2,235,978

UNITED STATES PATENT OFFICE

2,235,978

CONTINUOUS STRIP COATING MACHINE

Harvey M. Braucher, Baltimore, Md.

Application January 30, 1939, Serial No. 253,529

12 Claims. (Cl. 91—13)

This invention refers to the manufacture and production of metal plate and more particularly to that of the manufacture of sheet steel plate treated to an exterior covering or coating of protective of neutral material. It has among its objects to provide for the following list of features:

To coat or treat either or both surfaces of a sheet plate simultaneously;

To have it feasible to have the coatings placed on the two surfaces similar or distinct, at the same time of the process;

To have it adaptable for the use of a great field of materials for such coatings on the surfaces;

To have the machine operate with continuous lengths of sheet plate as they come off rolls, and treat them in such continuous lengths with the coatings selected, and to have it arranged to apply such coatings in the degree of thickness or application, as may be desired with certainty, predetermination, and uniformity;

To have arrangements for connecting lengths of the plate together in such continuity as will provide for the use of supplies of plate in sequence, to suit the use of each supply and the tie-in of the new supply indefinitely;

To avoid the need of shearing plates into limited sizes, for coating purposes, and to facilitate handling therefor;

To provide for the use of all kinds of materials suitable for coatings in any degree or sequence of application desirable or required, and on either side of the sheet plate;

To make the application of coatings to the sheet plates as economical in the use of the coating material, as practical, by providing for the recovery of the excess material used in the process, whether same be distributed in the air around the plates or applied to the plate in the prior instance;

To provide for the permanent setting and covering of the surfaces to be treated by the provision of heating suitable to the work to be done and the materials used, and the use of pressure to afford the greatest intimate attachment of the coatings on the sheet plate;

To provide for the treatment of the sheet plate by a series and multiple application of materials, such as fluxes, metals, paints, lacquers, minerals, liquids, etc. to suit the use to which the plate is to be put or the useful life tenure of the same under varied conditions and situations, or the physical situations or stresses arising in its installation or storage;

To provide for the use of minerals or synthetic lubricants and oils for the making of tinned strip instead of palm oils, as well as during the application of zinc and other molten metals or substances;

To overcome the disadvantages inherent with the dip processes and electroplating methods;

To provide for the economical production of sheet metal with coatings thereon, and in quantity lengths to suit extensive requirements;

To provide for inhibiting process where no other preventative requirements are involved;

To have means for heating the sheet plate to suit the application of the coatings before, during, or after such are made;

To provide arrangements for the inspection of the material being treated during each portion of the production and the use of special treatment such as sand blasting, tempering, washing, and polishing;

And another feature is to provide for the efficient application of a protective covering on the sheet material without its being cold rolled or put through the usual finishing processes required in conventional production. This takes advantage of the plate in such a condition to such an extent as to eliminate the need of its being cold rolled, and not affect coating values applied under the production methods of this invention; also to eliminate the temper-press operation now conventionally used.

Other features and objects of this invention will become apparent as the invention is more fully set forth.

The conventional method of manufacturing steel plate and its finishing and coating has serious objections which unlimited experimenting and trial operations over a considerable period have not overcome. Some of the objectionable features include: the inevitable and unavoidable use of palm oils for finishing sheet plate and use in molten applications; the unavoidable application of similar or same coatings to both surfaces where the dip process is used: The limited possibilities and time interval objections required in electro-plating processes; and the necessity of cutting or shearing of the plate into relatively small pieces where coatings are to be placed on the sheets; and the incidental handling, rolling, cleaning, skimming and extra processes required where coatings are to be put on in the conventional manner. The palm oils are necessary in the conventional process because of their heat characteristics, and they lessen the capacity of the sheet to take molten coatings, and after application, such oil coatings in excess have to be

removed, a matter of some appreciable difficulty. In this invention, not only is palm oil unnecessary, but can be displaced with ordinary mineral oils, just as effectively, and considerably more economically. The usual processes of coating, especially with tin, are subject to "pin-holes" corrosion, and create considerable argument and discussion between the plate mills and their customers. The results of experiments and investigation of governmental and private sources have established as a fact that this situation exists and results from the conventional system of coating steel by the dip process. This pin-hole corrosion has been found empirically to be practically overcome by the spraying process outlined in the description of this invention, and the use of a sufficient heat on the plate to make the tin or coating used fasten intimately and securely to it. This heating for the purpose of facilitating the coating of this sheet metal was not known before this invention by those versed in the art. Such a method was not followed in the conventional processes. The heating, specifically for the purpose of improving the application and covering by the coating materials is distinctly new and previously unpracticed in this art. In addition, this invention provides for the maximum intimate application of the coatings by subjecting them to high pressure during the application, causing the coating materials to enter among the external pores of the sheet metal and spread in and about same, overcoming the normal resistance and anticapillary action over the surfaces, by reason of the pressure and the fineness of division of the applied coatings. This action is so satisfactory that coatings may be applied under the processes of this feature of the invention, to the plate as it comes from the primary rolling mills to give the plate a complete finish. This avoids the customary necessity for cold rolling ordinarily required to give the metal a finished appearance to meet commercial requirements. In this invention, the prior heating of the metal to be coated and its use at that heat, for applying the coating, enables the metal to absorb the coating material and to squeeze the coating forced under pressure within its pores, throughout the exterior surface, making a solid and complete covering, which the conventional methods do not attain. The conventional tinning methods do not provide a uniform coating, and the usual commercial terms of weight-per-base-box, will include a variation between considerable limits, and the commercial world has to take it under such conditions. Thus, one pound per base box may have a tin content of from one-and-a-quarter to one-and-a-half pounds per base box. The method used to increase the tin content is very crude technically and is attained by speeding the material of the sheet plate through the oil dip by means of rolls and thereby decrease the effectiveness of the palm oil in taking the tin coating metal off. The result is more or less dependent on guesswork, roll pressure, luck, or particular skill in the individual operator. The spread of metallic tin over the surface by the usual method, at the same time, is not complete or efficient, which fact is made evident by the comparison of tin used for the process of this invention and that of the conventional process. The method of this invention uses about 25% to 30% less tin per base box and makes a more intimate and complete coating over the plate. Comparison in wear and tear of the metal coated by the process of this invention during a comparative six month test under the same conditions, for both this and the conventional process (the conditions providing a river bank location subject to weather and fresh and salt air dampness) indicated a complete surface corrosion action on the conventional plate, while a non-corrosive appearance was kept by the sample made under the process of this invention. The complete non-corrosion appearance continued for a long period afterwards.

In the drawings, which illustrate by way of example, an embodiment of this invention:

Figure 1 is an isometric diagrammatical view of a machine embodying this invention, with portions broken away to indicate the internal construction and operation,

Figure 2 is a side elevation of a slightly modified form of the invention,

Figure 3 is a detail view in elevation of the tacker mechanism used in the machine,

Figure 4 is a detail view of a preferred form of sprayer used in the machine,

Figure 5 is an enlarged detail of the elevation of the machine with the spray chamber and finisher room eliminated, to indicate the relative form of the tacker, trimmer and supply roll,

Figure 6 is a plan detail of the supply roll used for delivering sheet plate, and with its braking arrangement,

Figure 7 is a detail of the roll post used in the rolls for winding and heating the sheet plate thereon,

Figure 8 is a diagram of electrical and mechanical operative connections of the machine.

Similar reference characters refer to similar parts throughout the drawings.

In the construction shown in the drawings, the machine described in this specification consists in general of the following parts: delivery or supply rolls 1, on which the sheet metal plate 2 is contained for passage through the machine; a tacker mechanism or hydromatic spot welder 3 for connecting the plate from different rolls into a continuous sheet, so no intervals or breaks will exist in the continuous flow of sheet plate through the machine; a coating chamber 4, with single or multiple sprayers 6 for delivering coating materials to both surfaces of the plate 2 being processed; a finisher room 7 for taking the material after coating for drying or putting same in condition for shipment and finishing; a system of grippers 17 to engage on the material coming through and tension same sufficiently to make the material taut and flat as it travels through the previous portions and mechanisms of the machine, pull it along and force it to the trimmer mechanism 5 and receiving rolls 8, where the plate is wound up and made ready for delivery or storage. Suitable guide rollers or bars 9 are provided at selected portions of the machine for guiding the material in a predetermined manner through the processes mentioned. Other rollers 10 and 11 are disposed above and below the sheet or panel of metal plate on suitable frames to hold same in position and prevent it from sagging or getting out of line. These last mentioned rollers are situated in various suitable locations about the machine. Where the coatings require it, sufficient additional compartments 12, 13 and 14 are provided in the coating chambers, to take care of their specific requirements and prevent the undersirable intermixture of actions and materials that might cause objectionable effects.

This segregation of coating action is highly

important where the function and purpose of the coatings differ from each other, and have some relation to the sequence of actions on the treated plate.

The various operating parts are suitably connected up to gearing and transmission for actuating them to suit the movement of plate material through the machine. The tacker, welder or apparatus for connecting the sheet plates together is operated by the user, as the occasion necessitates, or it may be done automatically by the device 15. The trimmer mechanism is operated and cuts the sheets of plate as they pass by it, at the times that the user so determines, and particularly when it is necessary to disconnect two sheets that have been tacked together, and are to be diverted to different receiving rolls.

The rolls 1 and 8 are preferably set vertically and are mounted on revolving bases 18, resting on the frame 16 of the machine proper. The bases 18 are provided with peripheral gearing 19 operated through spur gears 20 that are mounted on a shaft 21 journalled on the frame. The bases 18 are arranged with central posts 22 on which plate material is wound. The posts are removable and may be lifted from the bases and placed therein, whenever such is desirable. The rollers 9 are vertically arranged and rotatably held in place in their bases 23 on the frame and in the upper journals 24. These journals are secured to the side walls 25 of the tacker 3. The first set of rollers serve to guide the sheet plate to a slot or opening 26 in the entering wall 27 of the sprayer chamber 4. The interior of the chamber 4 is divided up as one compartment 12 or into several, 12, 13 and 14, as the case may be, to suit the type and number of coatings to be placed on the metal plate passing through. The compartments are provided with suitable sprayers 6 or other equipment to spray, brush, or coat the material, and varying according to the type and class of cleaner, paint, or coating material used. The sprayers when used, are preferably of the metal spray Schoop type (U. S. 1,128,059) and set at an angle to the horizontal plane, and the sprayer heads 28, tilted slightly in another angle and plane to direct the spray material against the plate on a slant and thereby lessen the rebounding and piling up action of a direct spray on the plate material, and to cover a larger area per unit of coating.

The angular arrangement of the sprayers serves to provide a broader spray across the plate and to cover it more efficiently, using the rubbing and running gravitational flow of the sprayer heads to join all the individual areas sprayed together, in a complete coating area. The plate proceeds through the chamber and passes through an opening 29 in the rear wall 30 of the spray chamber. The under trough portion 31 of the spray chamber 4 is arranged to catch the excess coating material flowing off the plate, and collect it in receptacles for such further use as it may be fit for. This trough portion is preferably below the floor level and is secured to the frame in a suitable manner. The piping 35 removes the coating material from the receptacles underneath and conducts the excess coating material to suitable containers. A compressed air pump or other pressure system provides the necessary force to eject the material onto the plate with sufficient action to coat it properly.

The plate 2, passes through the spray chamber, and is directed by the secondary rollers 9 adjacent to the opening or slot 37 in the wall 38 in the finisher room. The finisher room is provided with electrical heaters 39, brushes, or drying means 40 to dry, or finish off the coatings that have been placed on the plate, whether on one side surface or the other or both. The slot or opening 41 in the rear wall 42 of the finisher room enables the plate to proceed out of the finisher room to the gripper mechanism 17, which frictionally engages against the coated finished surface of the plate and pulls it through under the tension, caused by the resistance to the movement of the plate and its supply rolls 1, and the use of an adjustable brake mechanism 43 on the removable base on the same. The grippers or typical pinch rolls are preferably mounted on the structure 44 of the trimmer, and have shafts with gearing 46, 45 thereon to revolve them, as well as a suitable resilient pressure mechanism 47 for tightening on the plate to suit the pressure required, and when it is needed. This last mentioned mechanism is adapted to release itself from the plate when such is decided upon. The trimmer 5 is secured to the frame of the machine and is designed with a shearing member or typical guillotine blade 48, which cuts the coated plate at the end of its run and at selected times. The mechanism 49 operates the shearing member in conjunction with the other mechanism, cooperatively with the continuous movement of the plate. The rolls 8 are mounted on the frame to receive the coated plate as it leaves the trimmer and are rotated by the shafts 22 inserted in the bases 18 to wind the finished plate thereon. The bases have peripheral gearing 19 which engage with the spur gear 20 connected on the common gears and shafts 54 of the machine. These rolls may be readily removed with their shafts by lifting same off the base.

The supply roll shafts or posts 22 are each provided with an internal heating element 58, which is connected with a source of electricity B and control switches A in the conventional manner, shown diagrammatically in the drawing, which it is believed make such connections obvious. Similarly, in the tacker mechanism 3, there is a heating element 35 which also is connected up and controlled suitably at A. A heating element 76 is installed in the finisher chamber and if desired, another in the spray chamber. These heating elements are for the purpose of heating the sheet metal plate as it enters into the tacker, sprayer chamber and finisher room respectively, and are used for keeping the material at the temperature best suited for the treatment about to be given the sheet metal and the substances used for coating same. This is so that the proper reaction will transpire in the use of the latter with regard to the plate, and particularly, will afford the proper and adequate coating on the plate. The manner in which the device 15 operates, provides for closing the circuit to the indicated solenoids and electrodes of the tacker when a double sheet of metal is passed through the same and comes in contact with the device or switch 15 at a suitable point of travel. Its location being determined by the tacking or welding operation of the tacker mechanism on the double sheets when the new sheet plate is to be attached to the old one already passing through the machine. The trimmer 5 is also provided with an automatic solenoid and switch 52 that makes contact and operates the shear when the double connection of plates reaches it and passes through to the rolls 8. The switch is provided with the necessary circuits to provide the electric current to

cause the motor or clutch 53 to operate the shear mechanism 49.

In the operation of the machine, the motor 55 actuates the common main shafting 54 and actuates the various rolls, grippers, and shearing mechanisms, and the sheet plate is pulled through the machine. The roll 1 supplying the plate to the machine to be processed is started through the gearing and the plate proceeds along until inserted through the rollers 9 and then into the slot 26 in the spray chamber 4. It passes through the chamber and out of the slot 29 in the rear wall 30, thence through the secondary guide rollers 9 to the slot 37, in the wall 38, of the finisher room. In this portion of the machine the plate is dried or finished to suit the coatings placed upon it by the sprayers in the spray chambers, and from thence it passes to the gripper rolls 17. The latter press against the material and pull it towards them, forcing same to the trimmer mechanism and receiving rolls 8. As the plate unwinds near the end of a roll 1, the sheet plate from another similar roll 1 placed adjacent to the first, is brought close to the first plate and through the operation of the mechanism and electrodes 56 and 57 respectively, is tack welded to the first plate. The first plate continues and carries along the new plate attached to it, which passes through the processes just described. When the joint reaches the trimmer, the shearing mechanism of the same through its automatic switch 52, is operated and trims off the end of the new plate, and allows the old plate to wind up on its receiving roll 8. The new plate is then propelled through the action of the gripping rolls 17, and the non-operation of the trimmer, through to an empty roll 8 waiting to receive it. The new plate is fastened to the new roll 8, and the latter is revolved to take the treated plate coming through the machine, without the interruption or stopping of the machine.

The post 22 of the rolls is arranged with a slot 68 for mechanically holding the end portion of the roll at the start of winding, and the bottom portion is squared off as indicated to fit securely in the base of the roll, to cause it to lock in and rotate with the latter in its operation. The post may be removed at any time, and enables rolls to be placed on or taken off the bases of the rolls 1 and 8 with a complete complement of sheet metal and do so with a certain amount of facility.

The purpose of the sprayer coatings is to cover or anticipate the effects of atmospheric conditions, protection against high temperatures; provide coatings to provide conductivity or resistivity; to overcome defects and unevenness of surfaces, to make decorative effects; make fire resisting; overcome the actions and reactions of immersed or liquid corrosion, and to apply superior, or high cost metals and substances to low cost base sheet metal. Some of the applications feasible with this machine are, coatings of aluminum, bronze, cadmium, copper lead, monel, nickel, nickel silver, steel, tin and zinc, using the sprayers of the Schoop type. Other sprays of the compressed air or pressure liquid type can apply coatings of paint, asbestos, oils, Celluloid, sand, etc. The application of coatings may be done in light layers or built up layers, in accordance with the requirements or needs in every case, and arrangements made to fix the particular substances on the sheet plate either at the same time or in subsequent steps in the process.

In the ordinary manner of treating steel plate with tin, the process uses a thin layer of zinc chloride floating on top of a batch of tin, kept at a temperature of about 570° F. in a form of holding box that permits the placing of palm oil on top of the tin directly, away from the zinc chloride. The cold sheet metal is passed through the zinc chloride first and is cleaned of dirt etc. and acts as a flux, so as to leave a clean surface for the tin to contact with. It then passes through the tin, and is coated with same, and then through the palm oil which removes excess tin in the manner already explained. When the tin contacts the steel plate, it alloys with the same close to its eternal skin, according to the general accepted theory on the subject, and this is mainly due to the temperature to which the steel has been raised passing through the extra hot tin, and the temperature of the tin. Without this high and equal temperature of the steel plate, there would be no proper connection between the steel and the tin. The melting point of tin is about 446° F. and this increase of temperature and heat enables it to heat the incoming steel to the proper temperature and although it is partially chilled by doing so, such reduction in heat and temperature brings it down to its melting temperature and allows it to combine and deposit on the steel. In the process of this invention, the heating elements indicated and used before spraying bring the steel to the desired temperature with or without recourse to the use of the heat in the metal of deposit, and this direct heating is preferable in the work, and the deposited metal from the sprayer makes a similar alloying connection with the plate in a more direct manner.

The Schoop sprayer used is preferably in a modified and improved form, using an electric heater instead of the oxyacetylene gas or similar type, and is the subject of another invention of the applicant, and arranged to keep the molten spraying metal at a high and melting temperature up to the point of deposit. The advantage of the process using the sprayers in this manner is obvious, in that it causes an actual definite combining of the sprayed metal with the base metal in addition to the sticking feature already explained, and is important in making a more complete superficial and intimate contact between both.

In the modified form shown in Figure 2, the spray chamber is indicated with a plurality of partitions adapted to divide the chamber into a plural number of chambers 12, 13 and 14, to enable the coatings to be placed to meet conditions where more than one spraying or coating is necessary or desirable. The manner of using the finisher or dry room, will depend on the processes of coatings. In some cases, the coatings may be baked on, in others brushed, in others the plate may be washed and cooled, and so on. The purpose of this invention is to anticipate such variations in processes, and make the machine applicable to all kinds of coatings and finishes for this class of work.

While but one form of the invention is indicated in the drawings, it is not desired to limit this application to such form or construction, other than limited by the prior art, as it is appreciated that other constructions might be made, employing the same principles and coming within the scope of the appended claims.

Having thus described the invention, what is claimed is:

1. A machine for the coating of metal sheets comprising in combination, means for propelling and guiding sheet metal in continuous lengths, and for vertically disposing the width dimension of same, and a plurality of pressure sprayers for coating the sheet metal on both surfaces independently of each other, means for dividing the sheet into predetermined lengths after said coating, and means for preheating the material before spraying, and for automatically welding additional plate material at predetermined periods and for shearing the plate.

2. A machine of the class described for coating sheet materials in continuous lengths, comprising in combination, a coating arrangement adapted to spread coating substances on the surfaces of the sheet materials longitudinally across the entire length of same continuously, means for registering the sheet materials and said arrangement together operatively and a frame for supporting said arrangement and means, means on the frame for keeping the width dimension of said sheet materials vertical during its passage past said arrangement and for directing the travel of the same in predetermined directions, means for directing the spreading of coating substances from the said arrangement through a plane angular to the plane of the sheet materials but adapted to spread the substances across relatively broad areas on the sheet and in cooperation with the gravitational pull on the substances thereon.

3. A machine of the class described for coating sheet materials in continuous lengths, comprising in combination, a coating arrangement adapted to spread coating substances on the surfaces of the sheet materials longitudinally across the entire length of same continuously, means for registering the sheet materials and said arrangement together operatively and a frame for supporting said arrangement and means, means on the frame for keeping the width dimension of said sheet materials vertical during its passage past said arrangement and for directing the travel of the same in predetermined directions, means for directing the spreading of coating substances from the said arrangement through a plane angular to the plane of the sheet materials but adapted to spread the substances across relatively broad areas on the sheet and in cooperation with the gravitational pull on the substances thereon, means on the frame for delivering and receiving the sheet materials in rolls adjacent to the said arrangement, and means for connecting the sheet materials of different rolls in continuous lengths.

4. A machine of the class described for coating sheet materials in continuous lengths, comprising in combination, a coating arrangement adapted to spread coating substances on the surfaces of the sheet materials longitudinally across the entire length of same continuously, means for registering the sheet materials and said arrangement together operatively and a frame for supporting said arrangement and means, means on the frame for keeping the width dimension of said sheet materials vertical during its passage past said arrangement and for directing the travel of the same in predetermined directions, means for directing the spreading of coating substances from the said arrangement through a plane angular to the plane of the sheet materials but adapted to spread the substances across relatively broad areas on the sheet and in cooperation with the gravitational pull on the substances thereon, means on the frame for delivering and receiving the sheet materials in rolls adjacent to the said arrangement, and means for connecting the sheet materials of different rolls in continuous lengths, and means for guiding and supporting the sheet materials in their travel by the said arrangement, means for tensioning the said sheet materials and for giving same the operative movement through the machine, said means being connected with the frame.

5. A coating machine for continuous panels of sheet metal plate, comprising in combination, a frame, rolls on the frame for holding rolls of metal plate vertically, brake mechanism for controlling the movement of the rolls, means for connecting plate from different rolls together for tying same into a continuous panel, said means being mounted on the frame adjacent to the said rolls, a heat retaining spraying chamber on the frame and disposed adjacent to the said means having openings therein for the free passage of the continuous panel therethrough and adapted to enclose the panel passing therethrough, spraying means in the said chamber, arranged to distribute coating materials under pressure on the surfaces of the panel, a finisher room disposed adjacent to the coating chamber on the frame and adapted to receive and enclose the said continuous panel, a dryer in the finisher room, means in the dryer for finishing the coating work on the plate, gripping means for taking the panel plate and pulling same through the machine, said gripping means for attachment to the frame adjacent to the finisher room, trimming means for shearing the plate passing from the dryer at predetermined times, and rolls for storing the plate passing from the trimmer to the same, and mechanism for operating the rolls, tacking device, gripping means, trimmer and spraying means for continuously coating the metal plate passing therethrough, and a plurality of guide means for directing the travel of the panel in predetermined directions with its width dimension vertically disposed through the machine.

6. A coating machine for continuous panels of sheet metal plate, comprising in combination, a frame, rolls on the frame for holding rolls of metal plate vertically, brake mechanism for controlling the movement of the rolls, means for connecting plate from different rolls together for tying same into a continuous panel, said means being mounted on the frame adjacent to the said rolls, a heat retaining spraying chamber on the frame and disposed adjacent to the said means having openings therein for the free passage of the continuous panel therethrough and adapted to enclose the panel passing therethrough, spraying means in the said chamber, arranged to distribute coating materials under pressure on the surfaces of the panel, a finisher room disposed adjacent to the coating chamber on the frame and adapted to receive and enclose the said continuous panel, a dryer in the finisher room, means in the dryer for finishing the coating work on the plate, gripping means for taking the panel plate and pulling same through the machine, said gripping means for attachment to the frame adjacent to the finisher room, trimming means for shearing the plate passing from the dryer at predetermined times, and rolls for storing the plate passing from the trimmer to the same, and mechanism for operating the rolls, tacking device, gripping means, trimmer and spraying means for continuously coating the metal plate passing therethrough, and a plurality of guide means for directing the travel of

the panel in predetermined directions with its width dimension vertically disposed through the machine, and means for preheating the plate before entering the sprayer chamber connected with the rolls, chamber, and finisher room.

7. A machine for the coating of flat sheet material comprising in combination, a coating chamber for receiving the said material with its width dimension in a vertical plane of travel therein and conserving its heat, coating means in the chamber disposed to distribute coating material through the chamber and on the surfaces of the sheet material, said means being arranged to localize the distribution at predetermined locations with respect to the chamber and the sheet material and to collect any excess coating material that may not be employed in coating the sheet material, said chamber being arranged to permit the sheet material to be conducted through and out of the same in a continuous manner, and means for keeping the sheet material taut and propelling it to the delivery end of the machine, and means for cutting the material for predetermined distribution, and means for supporting the said chamber and means.

8. A machine for the coating of flat sheet material comprising in combination, a coating chamber for receiving the said material with its width dimension in a vertical plane of travel therein and conserving its heat, coating means in the chamber disposed to distribute coating material through the chamber and on the surfaces of the sheet material, said means being arranged to localize the distribution at predetermined locations with respect to the chamber and the sheet material and to collect any excess coating material that may not be employed in coating the sheet material, said chamber being arranged to permit the sheet material to be conducted through and out of the same in a continuous manner, and means for keeping the sheet material taut and propelling it to the delivery end of the machine, and means for cutting the material for predetermined distribution, and means for supporting the said chamber and means, and means for preheating the material for the coatings to be placed thereon in the coating chamber.

9. A coating machine of the class described for the continuous treatment of sheet metal panels passing therethrough, rolls for holding the panel material in relatively long lengths, a tacking device for connecting lengths of the panel material together into continuous lengths, spraying means for receiving and enclosing the panel material therein, spraying or coating means in the said means for distributing coating materials thereon across the panel, a finishing room for conditioning the coatings placed on the plate, grippers for pulling the plate with its width dimension disposed in a vertical plane through the first mentioned means, and room, and from said rolls, a trimming machine for cutting the plate into predetermined lengths after coating, and to permit the distribution of same to variably placed receiving rolls.

10. A coating machine of the class described for the continuous treatment of sheet steel panels in continuous lengths, comprising in combination, means for conveying sheet steel panls continuously, a coating chamber adjacent said means for receiving the panels, means for applying coatings and finishes to the panels in the chamber, means for tacking the panels continuously together, and means for distributing the panel material in predetermined amounts at the delivery end of the machine, and means for pulling the material through the coating chamber under tension and for propelling the same to the delivery end of the machine, and means for preheating the panels just prior to coating and finishing and means for keeping the panel with its width dimension vertically disposed and unbent while passing through all of said means.

11. In a machine for coating steel plate, the combination of a plurality of chambers for coating and treating the plate having restricted openings in the walls thereof for the free passage of the plate therethrough but adapted to retain the coating and treating materials within the respective chambers; means for conducting the plate through the chambers under tension; and means for keeping the width dimensions of the plate vertical and unbent throughout, means in the chambers for coating the plate whereby the whole width will be sprayed during its travel therethrough, and means for propelling the plate into the interior of the chamber of the first chamber, through the intervening chambers and thence out of the last chamber.

12. In a coating machine for steel plate, the combination of a means for keeping the plate vertically positioned and taut as it passes with its longitudinal dimension in a horizontal direction, a plurality of sprayers facing the surfaces of the plate on both sides and adapted to coat the surfaces independently in a predetermined manner, and means for spreading and securing the coating permanently on the surfaces, and means for keeping the plate feeding continuously through the machine.

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