E. T. NEWSOME.

METHOD OF AND APPARATUS FOR FORMING HERMETICALLY SEALED METAL SHEETS.

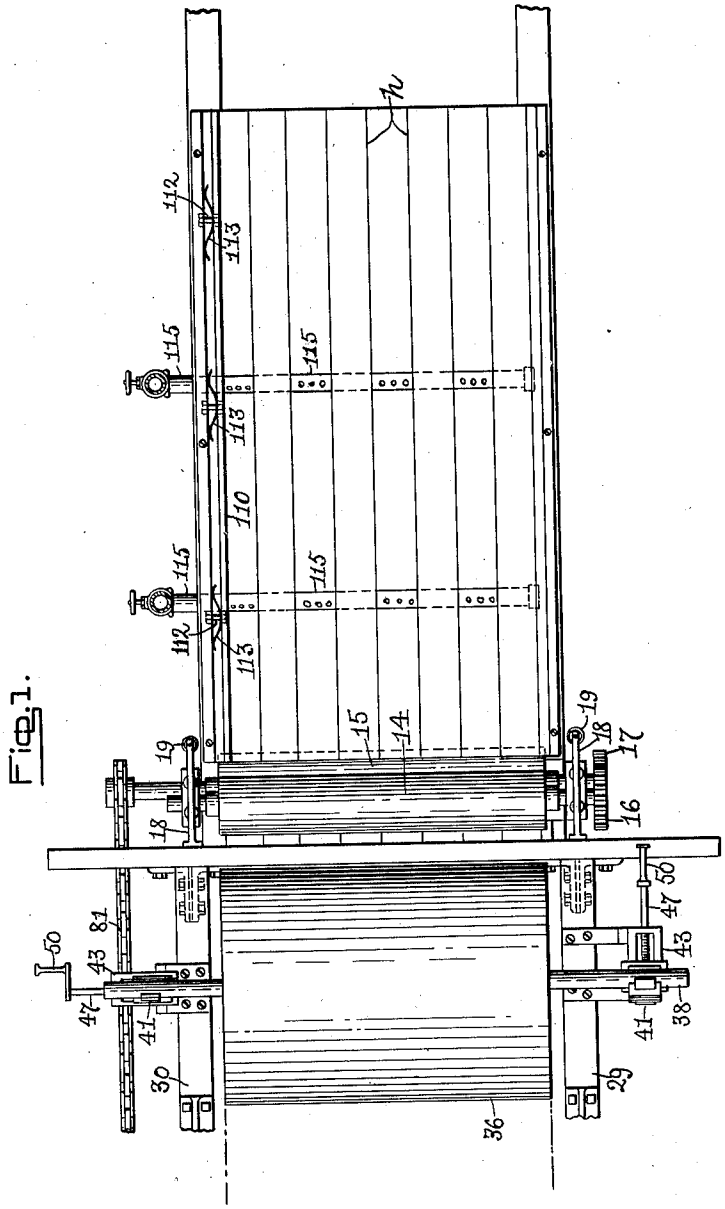
APPLICATION FILED DEC. 29, 1910.

1,002,303.

Patented Sept. 5, 1911.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

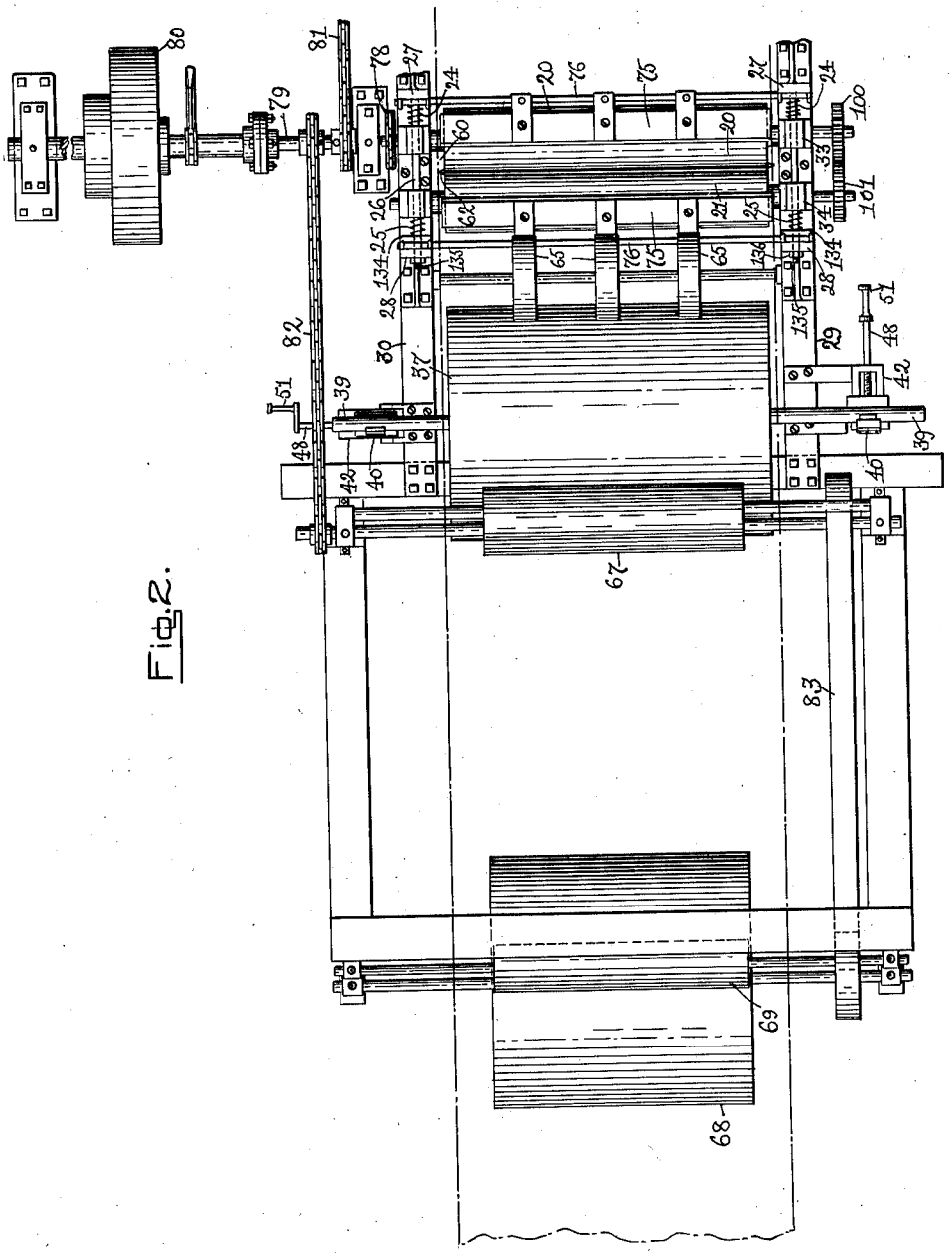

Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 6.

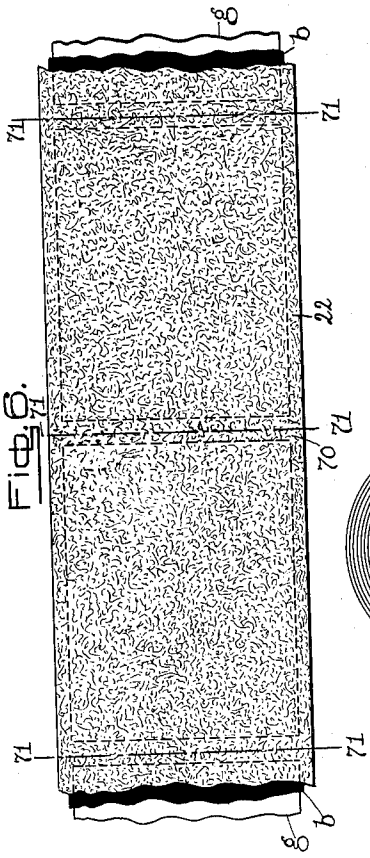
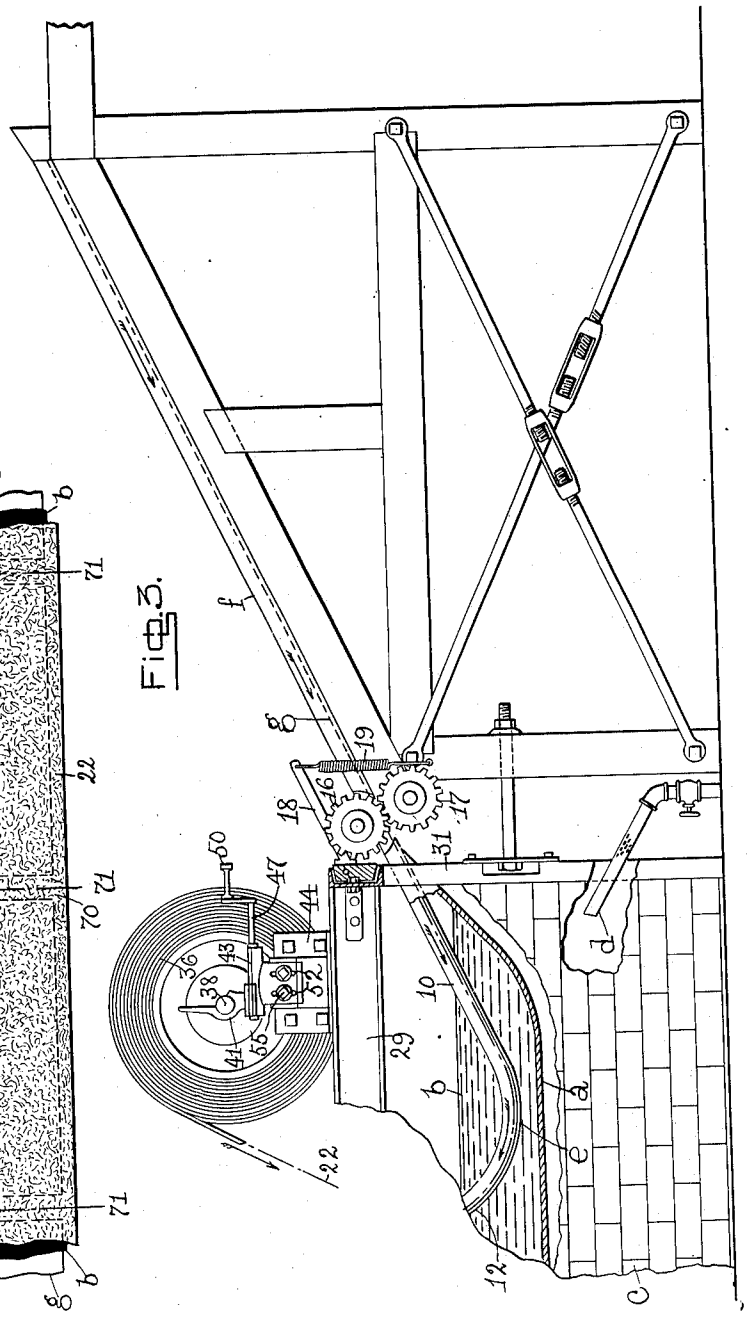


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 4.

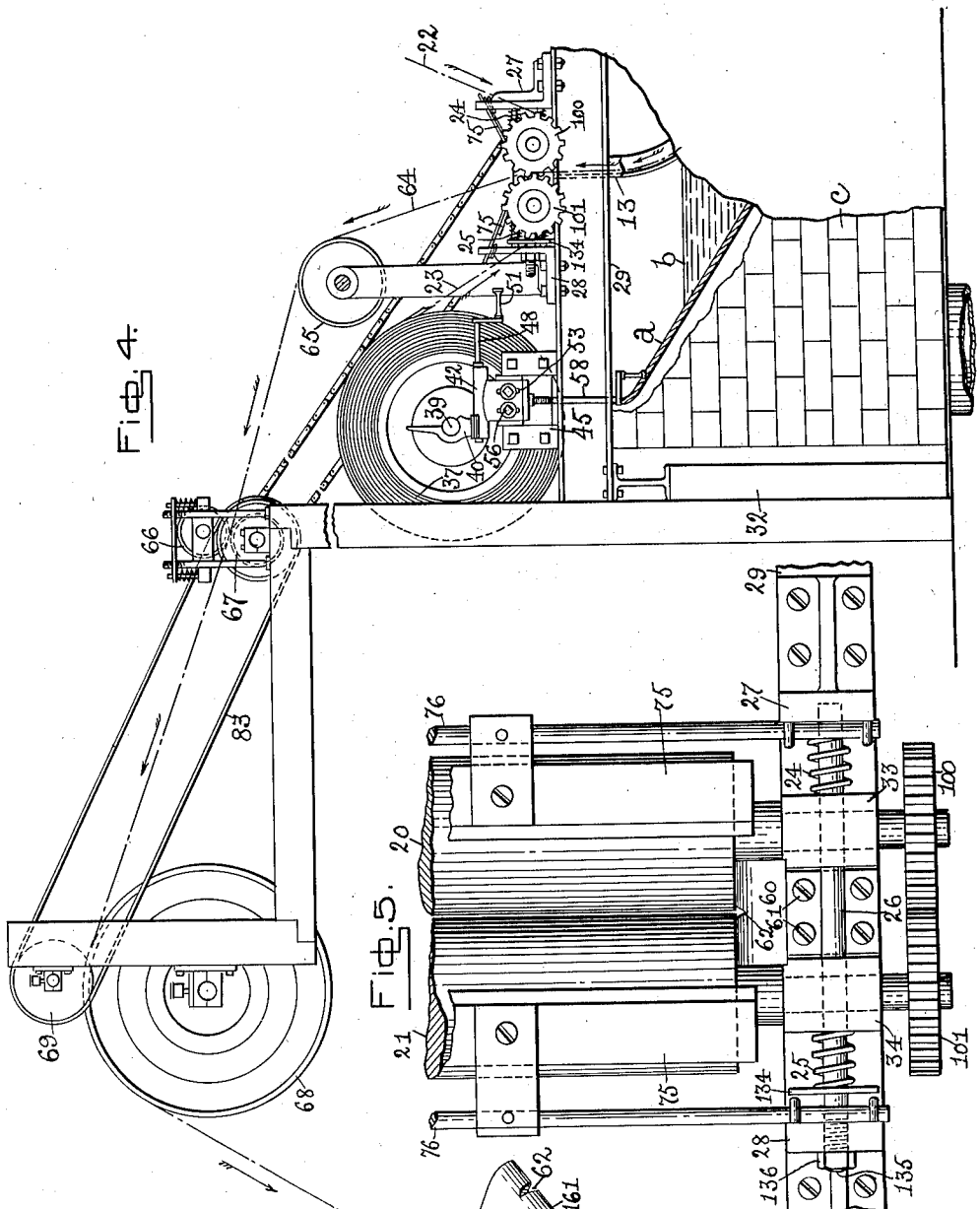
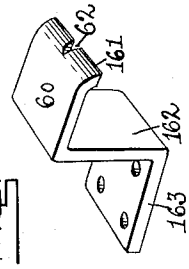


Fig. 5.

Fig. 5a.



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UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR FORMING HERMETICALLY-SEALED METAL SHEETS.

1,002,303.

Specification of Letters Patent. Patented Sept. 5, 1911.

Application filed December 29, 1910. Serial No. 599,895.

To all whom it may concern:

Be it known that I, EDGAR THOMAS NEWSOME, a citizen of the United States, residing in Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Methods of and Apparatus for Forming Hermetically-Sealed Metal Sheets, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to a novel method of and apparatus for forming hermetically sealed protected metal sheets, comprising external layers of fibrous material, such as asbestos, mineral wool, etc., and a sheet of metal, such as steel, which is interposed between said layers and is hermetically sealed thereby as will be described.

In accordance with this invention, the metal sheets are fed in succession into a bath of heated asphalt or other adhesive material and out therefrom in a substantially vertical direction between layers or webs of the fibrous material, which are fed from rolls located on opposite sides of the path of the metal sheet. The metal sheet on its passage through the bath of melted asphalt is coated by the asphalt, which serves to cement or affix the fibrous layers or webs firmly to the sheet, so that the fibrous webs act as a carrier for the individual metal sheets after the layers have been cemented thereto and to each other, as will be described. The metal sheets are fed into the bath so as to leave a space between successive metal sheets, so that when the said metal sheets are interposed between the layers or webs of the fibrous material, successive metal sheets are separated from each other by a predetermined amount of the fibrous webs, which are cemented together and afford means for sealing the ends of adjacent metal sheets when the said fibrous material is cut to form individual sheets. The webs of fibrous material are wider than the metal sheets, so that the side edges of the said webs may be cemented together by the asphalt or other cement to seal the protected sheet at its opposite sides. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figures 1 and 2 are plan views, to be read together, of an apparatus for producing hermetically sealed protected metal sheets. Figs. 3 and 4, side elevations, to be read together, of the apparatus shown in Figs. 1 and 2. Fig. 5, a detail in plan to be referred to. Fig. 5ª, a detail of the sealing device shown in Fig. 5, and Fig. 6, a detail in plan on a reduced scale of a portion of the product produced with the apparatus shown in Figs. 1 to 4.

Referring to the drawing, *a* represents a kettle, vat or receptacle for holding asphalt or other coating or adhesive material *b*, which will be hereinafter referred to as asphalt. The kettle *a* is supported by a furnace *c* of fire-brick or other suitable material. which is provided as herein shown with one or more gas or oil burners *d*, but instead of this particular method of heating the contents of the kettle *a*, any other desired means may be employed. The kettle *a* is open at its top and is provided with guides for the metal sheets, said guides being herein shown as grooved bars *e* located at the side walls of the said kettle. The guides *e* herein shown are provided with downwardly inclined portions 10, extended from the front end of the kettle toward its bottom and with upwardly curved portions 12, which terminate in substantially straight and vertical end portions 13.

In front of the kettle *b* is located a runway *f* for the metal sheets, which are indicated by the dotted line *g*. The runway *f* may be of any suitable construction and has its bottom *h* arranged with relation to the front end of the guideways or grooves *e*, so that the metal sheets may be fed by suitable feed rolls 14, 15, into the said guideways. The feed rolls 14, 15, are vertically arranged and provided at one end with intermeshing gears 16, 17, and are positively rotated, as will be described. The lower feed roll 15 may be journaled in stationary bearings, and the upper feed roll is journaled in bearings carried by pivoted levers 18, which are acted upon by springs 19 to hold the upper feed roll down on the metal sheet with a yielding pressure, to compensate for inequalities in the thickness of the metal sheets.

Above the kettle *a* and extended across the same are a pair of rolls 20, 21, which have a triple function; that is, they act as delivery rolls for the metal sheets *g*, as feed rolls

for continuous layers, length or webs 22, 23, of asbestos or other fibrous material, and as presser rolls for said webs. The rolls 20, 21, are horizontally arranged on opposite sides of the vertical path of the metal sheet, as it issues from the kettle *a*, namely, on opposite sides of the vertical portion 13 of the guideways *e*, and said rolls are yieldingly pressed toward each other by springs 24, 25, encircling stationary rods 26 supported by uprights 27, 28, fastened to side bars 29, 30, located at opposite sides of the kettle *a* above the same and secured to vertical supports 31, 32, the springs 24 bearing at one end against the uprights 27, and at their other end against the boxes 33 in which the delivery roll 20 is journaled. The other set of springs 25 encircle the rods 26 between the boxes 34 of the rolls 21 and movable plates 134, through which the rods 26 are extended and which have secured to them adjusting screws or bolts 135 extended through the uprights 28 and provided with nuts 136. By turning the nuts 136, the plates 134 may be moved toward or from the boxes 34 to vary the strength or tension of the springs 25 and thereby vary the pressure of the rolls 20, 21 upon the webs 22, 23, and the interposed sheets *g*. The springs 24, 25, are made of sufficient strength to firmly press the webs 22, 23, against the coated metal sheet and to draw the latter up out of the kettle. The webs 22, 23 are taken from rolls 36, 37 of the fibrous material, which are wound upon shafts 38, 39, journaled in bearings 41, 40, mounted to slide on supports 43, 42, which are vertically adjustable on stationary brackets or arm 44, 45, secured to the side bars 29, 30.

The bearings 40, 41, for the shafts 39, 38, and their slotted supports 42, 43, are preferably arranged as represented in Figs. 1 and 2, wherein the bearing and support for one end of each of the shafts 38, 39, are represented as extended in the direction of the length of said shafts, and the bearing and support for the other end of each shaft are extended transversely of the said shafts. The bearings 40, 41, are engaged by screw rods 48, 47, having handles 51, 50, by turning which said bearings may be moved with relation to the rolls 21, 20, so as to impart the proper or desired tension on the webs and to correct the feed of the webs, and said bearing supports may be vertically adjusted by means of the slots 53, 52, (see Figs. 3 and 4), and secured in their adjusted position by the screws or bolts 55, 56, and the roll 37 may be further adjusted vertically by the screw rod 58. The vertical adjustment of the bearing supports compensates for the irregular thickness in the roll of fibrous material.

The delivery rolls 20, 21, have coöperating with them at their ends devices for sealing the free edges of the webs and for keeping the ends of the rolls clean from asphalt. The devices referred to, are preferably made in the form shown in Fig. 5ª, each consisting of a horizontal top plate or bar 60 having a downwardly extended front edge or lip 161, a vertical bar 162 and a horizontal foot piece or plate 163, which is secured as by the screws 61 to the side frames of the apparatus, between the journal boxes 33, 34. The top plates or bars 60 are provided in their lips 161 substantially in line with the opening between the rolls 20, 21 with notches 62, preferably V-shaped, into which the sides of the fibrous webs cemented together and which project beyond the rolls are passed, the walls of said notches serving to scrape off the cement projecting between the edges of the webs and to seal the side edges of said cemented webs. The two webs 22, 23, with the interposed metal sheet to which they are cemented and which is represented by the broken line 64, is then carried upward over guide rollers 65, and then between feed rolls 66, 67, located at a higher level, and then rearwardly and upwardly between a large drum or feed roll 68 and a coöperating smaller roll 69.

It will be understood, that the metal sheets are fed into the bath of asphalt in succession, and that this feed is so timed as to leave a space between succeeding metal sheets, so that after each metal sheet has passed out of the kettle *a* and the webs 22, 23, have been cemented to its opposite surfaces, a portion of the two fibrous webs will be cemented together by the surplus asphalt, which is squeezed off of the preceding metal sheet, and that as a result the fibrous webs have interposed between them a plurality of metal sheets or flat bodies, which are separated from one another by portions 70 of the webs, which are cemented together, after the manner represented in Fig. 6, wherein two full metal sheets *g* are represented by dotted lines and the parts of two metal sheets are represented by full and dotted lines.

By reference to Fig. 6, it will be observed that the portions 70 of the webs 22, 23, which are cemented together between adjacent or succeeding metal sheets, are of substantial width so as to allow of their being cut transversely at the center as indicated by the dotted line 71 and leave the ends of the metal sheet sealed by the cemented ends of the webs. The portions 70 of the webs cemented together between adjacent sheets, also serve as flexible connections to allow the succeeding protected metal sheets to be assembled in the form of a pile, which is done by an operator as the protected sheets pass down from the roller 68.

The delivery rolls 20, 21, may have coöperating with them suitable scraper blades

or bars 75 extended longitudinally of the said rolls and secured as herein shown to supporting bars or rods 76 secured to the uprights 27, 28.

The shaft of the delivery roll 20 is connected by a link chain 78 with a main or driving shaft 79 provided with a driving pulley 80, and the roll 20 drives the roll 21 through the gears 100, 101. The shaft 79 is connected with the shaft of the lower feed roll 15 by the link chain 81, and with the shaft of the feed roll 67 by the link chain 82, and the feed roll 67 is connected by the belt 83 with the feed roll 69.

I have herein shown one construction of apparatus with which I may prefer to carry out the process of forming the sheets shown in Fig. 6, but it is not desired to limit the invention in this respect.

The runway *f* may be provided with a movable side wall 110, which is attached by suitable bolts 112 to a stationary side wall of the runway, the movable side wall being actuated by suitable springs 113, which maintain the movable wall in position to receive sheets of standard width and which yield sufficiently to allow slightly wider sheets to be fed through the runway, the bolts 112 sliding through the stationary side wall.

It may be desirable to heat the metal sheets while passing down the runway, and this result may be accomplished by the perforated burner pipes 115 located below the runway and connected with a suitable source of supply for gas or other fuel.

The bottom *h* of the runway may be formed of a continuous sheet, or it may be formed of substantially parallel bars, after the manner represented in the present instance.

The distance between the feed rolls 15, 16, and the delivery rolls 20, 21, is less than the length of the metal sheets so that the feed rolls feed the sheet through the bath until it is engaged by the delivery rolls.

Claims:

1. In an apparatus of the class described, in combination, a kettle for containing a bath of adhesive material and provided with guides for a metal sheet on its passage through said bath, said guides having a substantially straight portion leading up out of the kettle, delivery rolls for the coated metal sheet coöperating with the delivery end of said guides, rolls upon which webs of fibrous material are wound coöperating with said delivery rolls and from which the said webs are led under said delivery rolls to be affixed to the coated metal sheet and to be cemented together, plates or bars located at the ends of the delivery rolls and coöperating therewith to remove adhesive material from the ends of said rolls, and provided with notches through which the side edges of the cemented webs are passed to seal said edges, and means to carry the cemented webs with the metal sheets interposed between them away from the delivery rolls, substantially as described.

2. In an apparatus of the class described, in combination, a kettle for containing a bath of adhesive material and provided with guides for a metal sheet on its passage through said bath, said guides having inclined portions extended downwardly from the front end of said kettle toward the bottom thereof and then upwardly and terminating near the top of the kettle with substantially vertical end portions, feed rolls coöperating with the downwardly inclined portion of the said guides, and delivery rolls coöperating with the vertical portion of said guides, rolls upon which webs of fibrous material are wound coöperating with said delivery rolls and from which the said webs are led under said delivery rolls to be affixed to the coated metal sheet and to be cemented together, plates or bars located at the ends of the delivery rolls and coöperating therewith to remove adhesive material from the ends of said rolls, and provided with notches through which the side edges of the cemented webs are passed to seal said edges, and means to carry the cemented webs with the metal sheets interposed between them away from the delivery rolls, substantially as described.

3. In an apparatus of the class described, in combination, a kettle for containing a bath of adhesive material, means for guiding a metal sheet out of the kettle in a substantially vertical path, delivery rolls located on opposite sides of said vertical path to feed the coated metal sheet out of the kettle and to apply webs of fibrous material to the coated metal sheet, and means to seal the edges of said webs, substantially as described.

4. In an apparatus of the class described, in combination, a kettle for containing a bath of adhesive material, means for guiding a metal sheet out of the kettle in a substantially vertical path, means for applying layers of fibrous material to the opposite sides of the coated metal sheet, and means for sealing the edges of the fibrous layers, substantially as described.

5. In an apparatus of the class described, in combination, a kettle for containing a bath of adhesive material, means for guiding a metal sheet out of the kettle in a substantially vertical path, delivery rolls located on opposite sides of said vertical path, scrapers coöperating with the circumferences of said rolls, and scrapers coöperating with the ends of said rolls and located between the axes of said rolls and having an opening in a plane tangential to both rolls, substantially as described.

6. In an apparatus of the class described,

in combination, a kettle for containing a bath of adhesive material, means for guiding a metal sheet out of the kettle in a substantially vertical path, delivery rolls located on opposite sides of said vertical path to feed the coated metal sheet out of the kettle and to apply webs of fibrous material to the coated metal sheet, rolls located on opposite sides of the said delivery rolls and on which the webs of fibrous material are wound, bearings for said web-carrying rolls, and means for adjusting said bearings to move the web-carrying rolls with relation to the delivery rolls, substantially as described.

7. In an apparatus of the class described, in combination, a kettle for containing a bath of adhesive material, means for guiding a metal sheet out of the kettle in a substantially vertical path, means for applying layers of fibrous material to the opposite sides of the coated metal sheet, means for sealing the edges of the fibrous layers, and means for conveying the sealed layers away from the said kettle, substantially as described.

8. In an apparatus of the class described, in combination, a kettle for containing a bath of adhesive material, substantially horizontal delivery rolls located above said bath to receive a metal sheet on its passage up out of the said bath, rolls carrying webs of fibrous material supported above the kettle on opposite sides of the said delivery rolls to supply the latter with webs of fibrous material, which are applied to the opposite surfaces of the coated metal sheet, and means for carrying the said webs with a plurality of metal sheets between them away from the said delivery rolls, substantially as described.

9. The method of forming protected metal sheets, which consists in passing the metal sheets through a bath of adhesive material to cause the said metal sheets to be coated thereby and to pass out of the bath in a substantially vertical path, to permit the metal sheets to be washed by the surplus adhesive material flowing down over the sheet into the bath, applying to opposite surfaces of the coated metal sheets layers of fibrous material of greater width than the width of the metal sheets to permit the fibrous layers to be cemented together, timing the feed of successive metal sheets into the bath so as to leave a space between them to permit the fibrous layers to be cemented together between adjacent sheets and cutting the cemented webs between adjacent metal sheets to form individual sheets, substantially as described.

10. The method of forming protected metal sheets, which consists in passing metal sheets in succession through a bath of adhesive material so as to leave a space between them, applying to opposite surfaces of the metal sheets thus coated layers of fibrous material of greater length and width than the length and width of the metal sheets and cementing together by the coating material the said layers between successive metal sheets and at the sides thereof, sealing the side edges of the cemented layers with the coating material, and cutting the cemented layers between successive metal sheets to form individual protected metal sheets, substantially as described.

11. The method of forming protected metal sheets, which consists in coating the metal sheets with adhesive material, feeding the coated metal sheets between layers of fibrous material of greater length and width than the metal sheets so as to leave spaces between successive metal sheets, and pressing the said fibrous layers against the opposite surfaces of the metal sheets and against each other between successive metal sheets and at the sides thereof, substantially as described.

12. The method of forming protected metal sheets, which consists in coating the metal sheets with adhesive material, feeding the coated metal sheets between layers of fibrous material of greater length and width than the metal sheets so as to leave spaces between successive metal sheets, and pressing the said fibrous layers against the opposite surfaces of the metal sheets and against each other between successive metal sheets and at the sides thereof, and cutting the fibrous layers between successive metal sheets, substantially as described.

13. The method of forming protected metal sheets, which consists in coating the metal sheets with adhesive material, feeding the coated metal sheets between layers of fibrous materials of greater length and width than the metal sheets so as to leave spaces between adjacent metal sheets, and pressing the said fibrous layers against the opposite surfaces of the metal sheets and against each other between adjacent metal sheets and at the sides thereof, and cutting the fibrous layers between adjacent metal sheets, substantially as described.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

EDGAR T. NEWSOME.

Witnesses:
JAS. H. CHURCHILL,
J. MURPHY.