Dec. 23, 1941.

T. S. OKONSKI

2,267,534

SLITTING EXPANDED METAL

Filed June 3, 1941

3 Sheets-Sheet 1

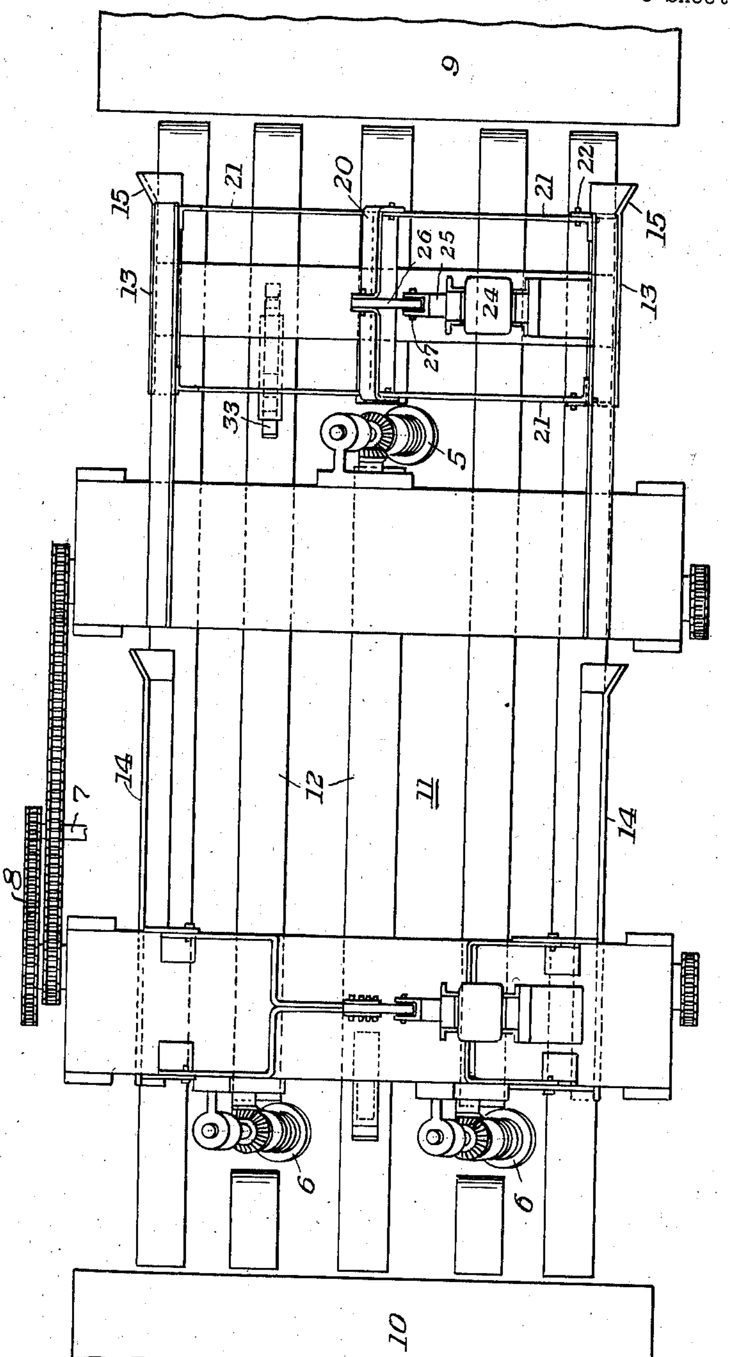

Fig. 1.

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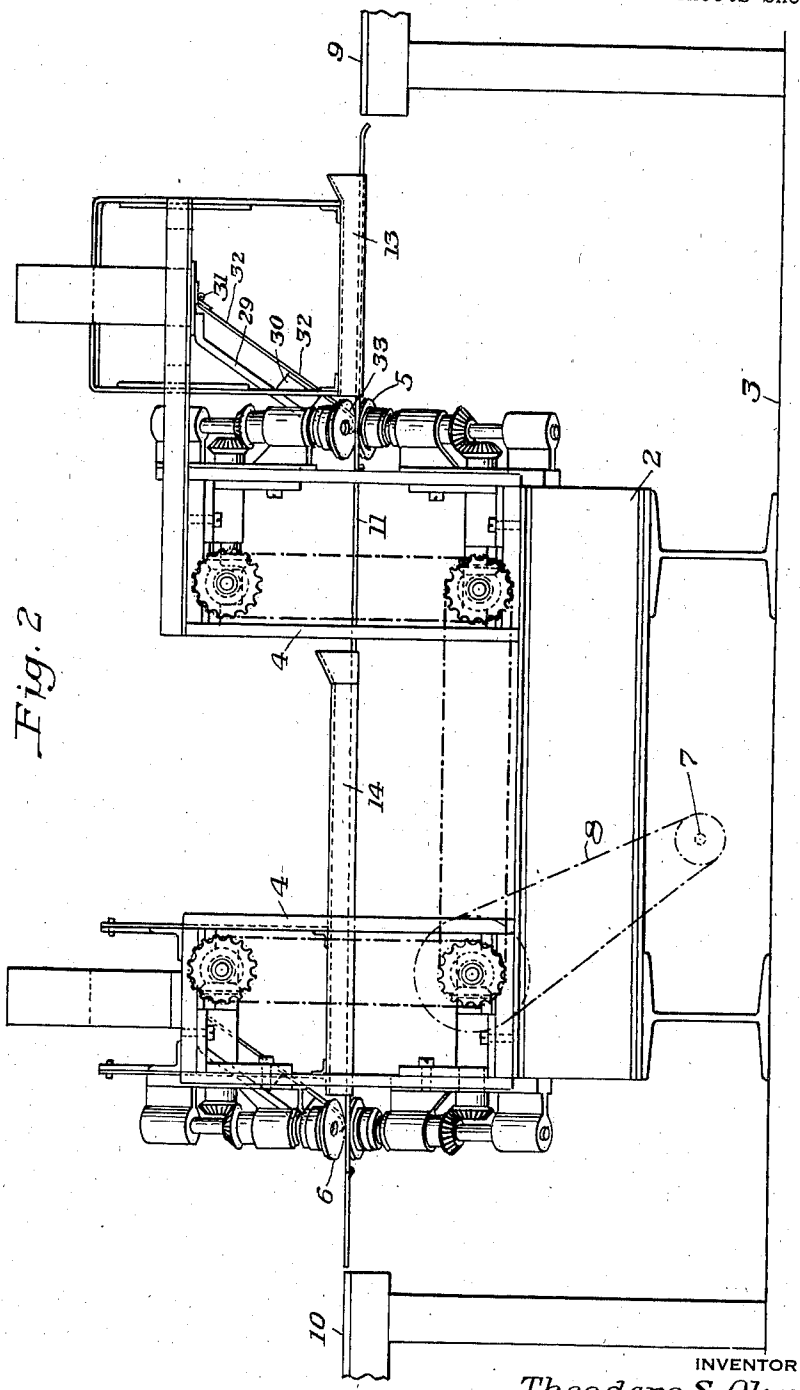

Fig. 2

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Fig. 4.

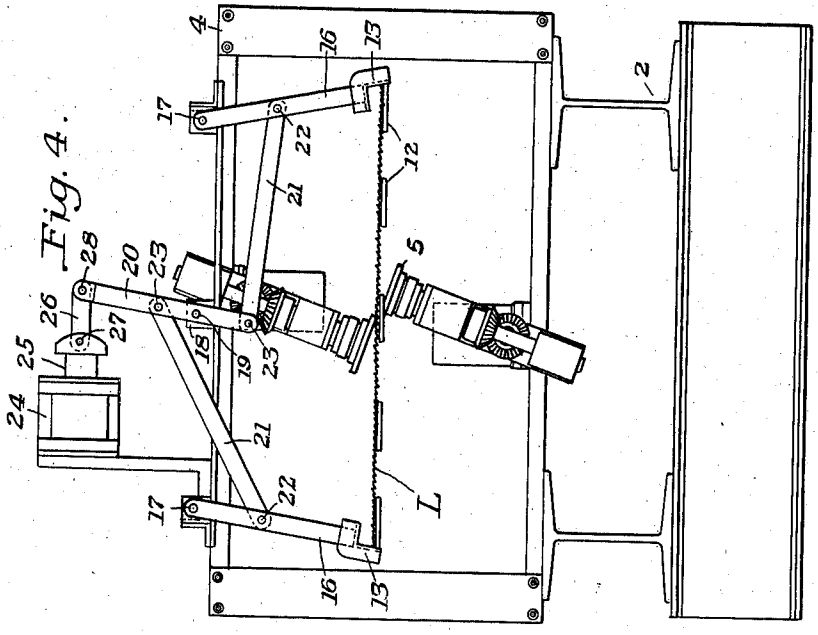
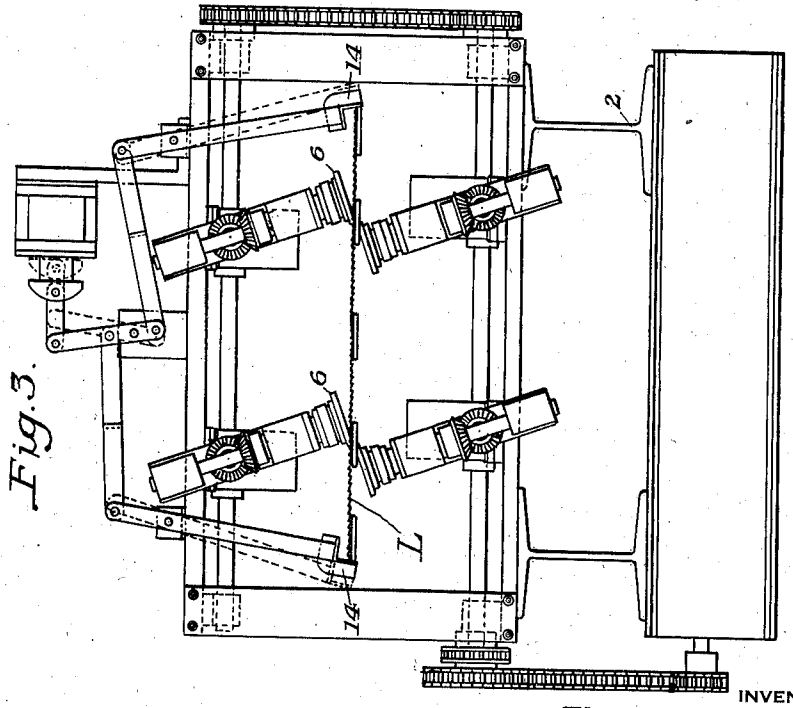


Fig. 3.



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Patented Dec. 23, 1941 2,267,534

UNITED STATES PATENT OFFICE

2,267,534

SLITTING EXPANDED METAL

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Application June 3, 1941, Serial No. 396,410

18 Claims. (Cl. 164—60)

This invention relates to slitting expanded metal. It relates further to the relative guiding of expanded metal and slitting means operating thereon so as to insure proper slitting. The invention still further relates to slitting expanded metal by a plurality of generally parallel slits and making provision for proper slitting despite irregularities in the expanded metal between the slits.

For purposes of explanation and illustration the invention will be described as embodied in a method of and apparatus for slitting expanded metal lath. The slitting of expanded metal presents problems which are somewhat peculiar and which problems have been solved in a novel and highly satisfactory way by my method and apparatus. While the invention may be employed in the slitting of either guillotine type expanded metal or expanded metal which is formed by separate slitting and expanding operations the invention has particular utility in the slitting of expanded metal lath which is formed from metal blanks which are first provided with aligned discontinuous slits by rotary cutters and then stretched out transversely of such slits to form the lath.

Expanded metal lath and its manufacture are well known. Expanded metal lath is made in sheets which are ordinarily in the neighborhood of 27" in width and from 8 to 9 feet long. Each sheet of lath in a common and preferred form consists of one integral piece of metal made up of strands connected by bonds, the sheet having therein generally diamond shaped openings defined by the strands and bonds. The strands and bonds extend generally lengthwise of the diamonds and such direction is herein considered as the direction of the length of the sheet. The direction transversely of the diamonds, or generally parallel to the minor axes of the diamonds, is herein considered as the direction of the width of the sheet.

In the formation of expanded metal lath the strands and bonds become tilted relatively to the plane of the sheet of lath, this resulting in the lath having faces which in the longitudinal direction are somewhat grooved. The longitudinal grooves are defined and bounded by the angularly positioned strands and bonds. When the lath is formed by stretching out the previously slitted metal blank the longitudinal rows of diamonds or of communicating strands and bonds which form the diamonds are not always perfectly straight and parallel. Due to various factors involved in the manufacture of expanded metal lath the longitudinal rows of diamonds are generally and almost always wavy or curved to some extent. Moreover, such rows are not uniformly spaced throughout the sheet. At one point in a sheet of expanded metal lath the transverse distance between transversely aligned bonds in two selected rows may be substantially different than the transverse distance between transversely aligned bonds in the same two rows at another point in the sheet.

It is desirable to longitudinally slit sheets of expanded metal lath to form relatively narrow strips in which the diamonds extend longitudinally, such strips being used for making cornerite and for other purposes. The art of thus longitudinally slitting expanded metal lath is not new, as such slitting has been done for many years. However, the methods and apparatus which have been employed for longitudinally slitting expanded metal lath have not been fully satisfactory. Difficulty has been experienced in the relative guiding of the slitters and the lath due to the fact that the longitudinally extending rows of diamonds in the lath are not straight or parallel. It has heretofore been proposed to advance a sheet of expanded metal lath through a gang of slitters arranged in a line parallel to the transverse dimension of the sheet and to guide the lath during slitting by a side guide. It has also been attempted to guide sheets of expanded metal lath by rotary guides in effect integral with rotary slitters arranged in a line parallel to the transverse dimension of the sheet. These attempts have not been successful because the slitters and guiding means are fixed in a direction transversely of the sheet while the rows of diamonds are not uniformly positioned in the transverse direction throughout the sheet but are more widely separated at one point longitudinally of the sheet than at another point. Thus when a sheet of expanded metal lath is advanced against a side guide and simultaneously slitted by a slitter in transverse alignment with the side guide and which is fixed relatively to the side guide or when it is attempted to guide the sheet by guides formed integrally with rotary slitters which are fixedly positioned in alignment in a direction transversely of the sheet a slitter may not follow the same longitudinal line of bonds throughout the sheet. When the transverse distance between the guided edge of the sheet and a row of bonds being slitted varies from the transverse distance between the side guide and a slitter fixed in transverse alignment with the side guide or when the transverse distance

between rows of bonds being slitted varies from the transverse distance between transversely aligned and fixed slitters there is a tendency either to stretch or to bend up or buckle the expanded metal and this tendency results in irregular slitting and movement of the slitter or slitters from one to another row of bonds during the slitting. The result is production of strips which are not the same number of diamonds wide throughout their lengths and with ragged and dangerous edges.

I have devised a method and apparatus for slitting expanded metal, which method and apparatus are particularly adaptable for the slitting of expanded metal lath, obviating all of the disadvantages above mentioned and insuring satisfactory and rapid slitting regardless of irregularities in the material. I have found that I can use rotary slitters of known type but that the material should not be guided by a side guide while it is being slitted by a slitter in transverse alignment with the side guide. Also, the material should not be slitted by a plurality of slitters in transverse alignment operating simultaneously upon the same transversely continuous piece of material. I provide for guiding the material during slitting by the slitters alone and avoiding contact with the material of any separate guide means in transverse alignment with a slitter while such slitter is operating on the material. In slitting a sheet by a plurality of generally parallel slits I arrange the slitters in offset relationship both transversely and longitudinally of the direction of slitting. I arrange the slitters so that at no time is a transversely continuous piece of material being slitted simultaneously by more than one slitter.

In the slitting of expanded metal lath I prefer to provide a table or support for relatively supporting the slitters and lath and to relatively advance the slitters and lath to accomplish the slitting. It will be understood that the lath may be held stationary and the slitters advanced relatively thereto or the slitters may be stationarily positioned and the lath advanced relatively thereto or the slitters and lath may be moved simultaneously to accomplish the relative advance and slitting. In the present preferred embodiment of the apparatus shown in the accompanying drawings the slitters are mounted in fixed position upon a fixed base and the material is advanced relatively thereto. I prefer to guide the material during its approach to the slitters but not by any guide means in transverse alignment with a slitter operative during operation of such slitter. I preferably employ one or two side guides guiding the material as it approaches a slitter and render such guide or guides inoperative at about the time and preferably somewhat before the slitter begins to slit the material. Thus the material while it is being slitted is free to move transversely, the slitters themselves forming the sole guiding means acting on the sheet throughout its transverse extent at the point of slitting.

When a sheet is to be slitted by a plurality of generally parallel slits I advance the sheet first to one slitter and subsequently to one or more additional slitters. The first slitter slits the sheet into two strips. Subsequently one or both of such strips may be slitted into narrower strips and such narrower strips may still later be further slitted if desired. By avoiding acting upon any transversely continuous piece of material by more than one transversely aligned slitter and guiding the material by the slitters alone I accomplish a rapid, smooth and efficient slitting free from the difficulties heretofore encountered.

The rotary slitters which I preferably employ engage the expanded metal in known manner to slit it through longitudinal rows of bonds as the expanded metal moves relatively to the slitters. Examples of slitters of this type are to be found in United States Patents Nos. 1,768,978 and 2,223,497. Consequently I shall avoid going into unnecessary detail as to the manner in which the slitters slit the longitudinally aligned rows of bonds of the expanded metal.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof and a present preferred method of practicing the same proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention and have illustrated a present preferred method of practicing the same, in which—

Figure 1 is a plan view of slitting apparatus;

Figure 2 is a side elevational view of the apparatus shown in Figure 1;

Figure 3 is an end elevational view of the apparatus as viewed from the left in Figures 1 and 2, parts being omitted for clarity; and

Figure 4 is an end elevational view of the apparatus as viewed from the right in Figures 1 and 2, parts being omitted for clarity.

Referring now more particularly to the drawings, there is provided a base **2** mounted upon a floor **3** and carrying a superstructure **4**. The superstructure **4** carries a front slitter **5** and rear slitters **6**. These slitters are of known type as disclosed in the above mentioned patents, each comprising a pair of cooperating driven rotary slitting blades. The slitters are especially adaptable for slitting expanded metal since the cooperating rotary blades enter the longitudinal grooves in the sheet of expanded metal and position themselves relatively thereto to effect the slitting. The slitters are driven by a motor having a shaft **7** driving a belt or sprocket chain **8** which through suitable connections such as shown in the drawings drives the slitters in such direction as to advance the sheet from right to left viewing Figures 1 and 2.

There are provided an entering table **9** and an exit table **10** and the superstructure **4** carries an intermediate table or support **11** upon which the material being slitted is adapted to rest as it moves through the slitter. The support **11** may be in the form of separate spaced strips **12** as shown or may be transversely continuous. The use of spaced strips is desirable since this reduces the friction on the material as it advances through the slitter. The support **11** is interrupted at each of the slitters **5** and **6** to permit the coacting rotary slitter blades to assume their proper cooperative position in the path of the advancing sheet and thereby slit the sheet as it moves through the slitter.

I provide side guides **13** in advance of the front slitter **5** and side guides **14** in advance of the rear slitters **6**. The cooperating guides **13** are when in operative position spaced apart a distance only slightly greater than the width of the sheet so that they insure against improper presentation of the sheet to the front slitter **5**. A sheet is preferably advanced toward the left, viewing Figures 1 and 2, on the table **9** and thence to the support **11**. In Figures 3 and 4 expanded metal lath is shown diagrammatically at L.

Since this is a well known material no detailed showing of it is made. Such material is shown in detail in the patents above mentioned. The forward edge of the sheet enters between the guides 13 which have flared nose portions 15 to insure against the front edge of the sheet catching upon the guides as it moves toward the slitters. The sheets may be advanced to the front slitter 5 manually or mechanically. I find it satisfactory to advance the sheets manually over the table 9 and over the forward portion of the support 11 and between the guides 13. At such time the guides 13 are in operative position as shown in Figure 4. The sheet is moved toward the front slitter 5, the guides 13 insuring, as above indicated, that it will not be subject to lateral misalignment. As the front edge of the sheet enters the slitter 5 the rotary slitting blades which are rotating at high speed in such a direction as to advance the sheet toward the left, viewing Figures 1 and 2, automatically find proper cooperative relationship with respect to a row of bonds of the expanded metal so as to slit such bonds as the sheet advances. In case the row of bonds to be slit by the front slitter 5 is slightly to one side or the other of the cooperating rotary slitter blades as the front edge of the sheet reaches the slitter 5 such front edge will move slightly toward one side or the other to automatically effect proper alignment. Such movement is accomplished because if the slitter is not in exact alignment with a row of bonds as the front edge of the sheet comes into contact with the slitter it will contact an inclined strand which will cause the front edge of the sheet to ride slightly toward one side or the other until the slitter blades properly cooperate with the first bond in the row of bonds to be slitted.

Thus the slitter 5 itself determines the transverse position of the front edge of the sheet as the sheet moves into engagement therewith. Moreover, the high speed rotary action of the slitter is sufficient to itself advance the sheet while simultaneously guiding and slitting it. In order to free the sheet to be guided by the slitter 5 and to allow its front edge to move slightly toward one side or the other as the slitter moves into engagement with the first bond of the longitudinal row of bonds to be slitted I render inoperative the guides 13 at approximately the time the front edge of the sheet engages the slitter 5. I find in practice that it is desirable to render the guides 13 inoperatve just before the front edge of the sheet engages the slitter 5 so that at the instant of engagement the front edge of the sheet is free to move slightly laterally unimpeded by any guiding means acting thereon except the slitter itself. The means for rendering the guides 13 inoperative will now be described.

Each guide 13 is carried by a pair of arms 16 pivoted to the superstructure 4 at 17. A bracket 18 is fastened to the superstructure and carries a pivot 19 for a double armed lever 20. A link 21 is pivoted to each arm 16 at 22 and to an arm of the lever 20 at 23. A solenoid 24 is mounted on the superstructure and has its plunger 25 connected with the upper end of the lever 20 through a link 26 pivoted to the solenoid plunger at 27 and to the lever 20 at 28.

The superstructure 4 includes a bracket 29 carrying a switch 30. Pivoted to the superstructure at 31 is an operating arm or detent 32 which extends downwardly and has a foot 33 normally resting on the support 11. The switch 30 is connected in the circuit of the solenoid 24. The solenoid, as usual, has a spring (not shown) urging the plunger 25 outwardly toward the right viewing Figure 4. When the switch 30 is closed by raising of the detent 32 the solenoid is energized to draw the plunger 25 toward the left, viewing Figure 4, against the action of its spring, which, through the lever 20, the links 21 and the arms 16, swings the guides 13 outwardly to inoperative position relatively to the sheet. As the forward edge of the sheet moves from right to left viewing Figure 1 over the support 11 it raises the detent 32 due to the fact that the sheet has substantial thickness and passes between the foot 33 and the support 11. This raising of the detent 32 operates the switch 30 to energize the solenoid and render the guides 13 inoperative. Thus the guides 13 simply insure against lateral misalignment between the sheet and the slitter 5 as the sheet is presented to the slitter and immediately upon or slightly before the actual engagement between the slitter and the sheet the guides are swung out away from the edges of the sheet and are inoperative so long as the sheet is passing under the detent 32. When the trailing edge of the sheet passes out from under the detent 32 this permits the detent to drop back to rest upon the support 11 and the switch 30 opens, thus allowing the spring in the solenoid 24 to move the plunger toward the right, vewing Figure 4, to return the guides 13 to operative position in readiness for guiding the succeeding sheet.

The guides 14 in advance of the slitters 6 are mounted and operated by mechanism substantially identical with that by which the guides 13 are mounted and operated and the guides 14 function precisely analogously to the guides 13. Thus the detailed description of the mechanism for mounting and operating the guides will not be repeated. As the forward edges of the separated portions of the sheet which has been slitted by the slitter 5 approach the slitters 6 such portions of the sheet are held against moving laterally off of the support 11 by the guides 14. Just as the forward edge of each of such portions of the sheet substantially reaches one of the slitters 6 the guides 14 are rendered inoperative, being swung outwardly as in the case of the guides 13 above described. Thus at no time is the material being slitted engaged simultaneously in transverse alignment by a slitter and a separate guide. The only guides separate from the slitters are the guides 13 and 14 and these function only to insure against transverse misalignment as the forward edge of the material is presented to the slitters and are moved transversely out of contact with and away from the side edges of the material just at, or somewhat prior to, commencement of the slitting operation by the slitter or slitters immediately following the guides. I find that the sheets of expanded metal lath which I slit on the apparatus shown move through the apparatus rapidly and without undue stress or strain either on the material or on the slitters and without any tendency of the material to buckle or become deformed or of the slitters to jump from one row of bonds to another during the slitting.

As shown in Figure 3, the slitter 5 is positioned to slit the original sheet substantially centrally and each of the slitters 6 is positioned to slit a portion of the sheet at one side of the slitter 5 substantially centrally. Thus the sheet in a single pass through my apparatus is slitted into

four strips each approximately one-fourth as wide as the original sheet. At no time is any transversely continuous portion of the sheet subjected simultaneously to the action of a plurality of slitters or to the action of a slitter and a separate guide. Thus every portion of the sheet being slitted is free to be guided by the slitters during the slitting operation and each slitter is free from interference by any other slitter or other mechanism in transverse alignment therewith.

While I have shown and described a present preferred embodiment of the invention and a present preferred method of practicing the same it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

1. A method of slitting a sheet of expanded metal along a row of bonds which is approximately straight but which may be somewhat wavy comprising relatively moving toward each other the sheet and a slitter adapted to cooperate with the bonds of said row to slit them while guiding the slitter relatively to an edge of the sheet until insuring commencement of the slit at a desired place in the sheet and not later than during the early portion of the slitting discontinuing guiding the slitter relatively to an edge of the sheet whereby to permit making the slit along a wavy row of bonds.

2. A method of slitting a sheet of expanded metal having a slitter guiding portion intermediate its edges comprising relatively moving the sheet and a slitter toward each other while guiding the slitter relatively to an edge of the sheet until insuring commencement of the slit at a desired place in the sheet and not later than during the early portion of the slitting discontinuing guiding the slitter relatively to an edge of the sheet and guiding the slitter relatively to the sheet by said portion of the sheet.

3. A method of slitting a sheet of expanded metal longitudinally of the strands thereof comprising relatively moving the sheet and a slitter toward each other while guiding the slitter relatively to an edge of the sheet until insuring commencement of the slit at a desired place in the sheet and not later than during the early portion of the slitting discontinuing guiding the slitter relatively to an edge of the sheet and guiding the slitter relatively to the sheet by the expanded metal itself.

4. A method of slitting a sheet of expanded metal longitudinally of the strands thereof comprising relatively moving the sheet and a slitter toward each other while guiding the slitter relatively to the sheet by means including a side guide engaging an edge of the sheet until insuring commencement of the slit at a desired place in the sheet and not later than during the early portion of the slitting moving the side guide out of engagement with the sheet and guiding the slitter relatively to the sheet by the expanded metal itself.

5. A method of slitting a sheet of expanded metal by a plurality of generally parallel slits comprising relatively moving the sheet and a slitter having a plurality of slitting heads in such manner than a portion of the sheet extending transversely of the slits is first slitted by one head and thereafter slitted by another head.

6. A method of slitting a sheet of expanded metal by a plurality of generally parallel slits extending longitudinally of the strands thereof comprising in a continuous slitting action first slitting a portion of the sheet extending transversely of the strands to form two severed parts and thereafter slitting at least one of said parts.

7. A method of slitting a sheet of expanded metal by a plurality of generally parallel slits extending longitudinally of the strands thereof comprising in a continuous slitting action first slitting by a slitter a portion of the sheet extending transversely of the strands to form two severed parts and thereafter slitting by another slitter at least one of said parts and guiding at least one of the slitters relatively to the sheet by the expanded metal itself.

8. A method of slitting a sheet of expanded metal by a plurality of generally parallel slits extending longitudinally of the strands thereof comprising in a continuous slitting action first slitting by a slitter a portion of the sheet extending transversely of the strands to form two severed parts, thereafter slitting by another slitter at least one of said parts, guiding at least one of the slitters relatively to the sheet prior to action of said slitter on the sheet by guiding means separate from said slitter and guiding at least one of the slitters relatively to the sheet during action of said slitter on the sheet by the expanded metal itself.

9. Slitting apparatus comprising a slitter, means for guiding the slitter relatively to a sheet of material such as expanded metal or the like as the slitter and material approach each other and means operable not later than during the early portion of the slitting of the sheet by the slitter rendering inoperative said guiding means.

10. Slitting apparatus comprising a slitter and means for relatively supporting the slitter and a sheet of material such as expanded metal or the like to be slit thereby, the slitter comprising common means for simultaneously relatively advancing the slitter and material and slitting the material, said means also constituting the sole means for relatively guiding the slitter and a transverse portion of the material being slitted.

11. Slitting apparatus comprising a plurality of slitters successively operable upon material such as expanded metal or the like to slit the same and means for relatively guiding the slitters and material engaging the material only at a portion thereof which at the time of such engagement is approaching a slitter.

12. Slitting apparatus comprising a pair of slitters, means for relatively supporting the slitters and a sheet of material such as expanded metal or the like adapted to be advanced relatively to the slitters generally rectilinearly to be slit thereby, the slitters being arranged in substantially parallel slitting relation but being offset from each other both transversely and longitudinally of the direction of advance of the sheet so that no two slitters are either transversely or longitudinally aligned.

13. Slitting apparatus comprising a table along which a sheet of material such as expanded metal or the like is adapted to be advanced generally rectilinearly, a slitter mounted in fixed position relatively to the table in the path of advance of the material to slit the same and another slitter mounted in fixed position relatively to the table in the path of advance of the material but offset from the first mentioned slitter both along said path and transversely of said table to slit one of the portions of the material formed by the first mentioned slitter.

14. Slitting apparatus comprising a pair of

slitters, means for relatively supporting the slitters and a sheet of material such as expanded metal or the like adapted to be advanced relatively to the slitters generally rectilinearly to be slit thereby, the slitters being offset from each other both transversely and longitudinally of the direction of advance of the sheet, the slitters themselves constituting the sole means for guiding the sheet while both slitters are operating thereon.

15. Slitting apparatus comprising a slitter, means for guiding the slitter relatively to a sheet of material such as expanded metal or the like as the slitter and material approach each other and means operable by the sheet for rendering inoperative said guiding means.

16. Slitting apparatus comprising a table, a slitter adapted to slit a sheet of material such as expanded metal or the like moving along the table, a side guide adapted to engage an edge of the sheet to guide the sheet along the table and means operable by the sheet at a predetermined point in its travel rendering said side guide inoperative.

17. Slitting apparatus comprising a table, a slitter adapted to slit material such as expanded metal or the like moving along the table, a guide adapted to engage the material while it moves along the table to guide the material and means operable at a predetermined point in the movement of the material along the table to withdraw the guide from engagement with the material.

18. Slitting apparatus for slitting expanded metal longitudinally of the strands thereof comprising a pair of slitters and means for relatively supporting the slitters and expanded metal for relative movement therebetween generally rectilinearly but along somewhat curved rows of strands of the expanded metal, the slitters being offset from each other both in a direction transverse of the rows of strands of the expanded metal and in a direction longitudinally of such rows of strands, the slitters themselves constituting the sole guiding means for relatively guiding the slitters and the expanded metal while both slitters are slitting the expanded metal.

THEODORE S. OKONSKI.

CERTIFICATE OF CORRECTION.

Patent No. 2,267,534. December 23, 1941.

THEODORE S. OKONSKI.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, line 70, claim 5, for "than" read --that--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of March, A. D. 1942.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)