N. E. CLARK.

METAL WORKING.

APPLICATION FILED FEB. 11, 1913.

1,146,552.

Patented July 13, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

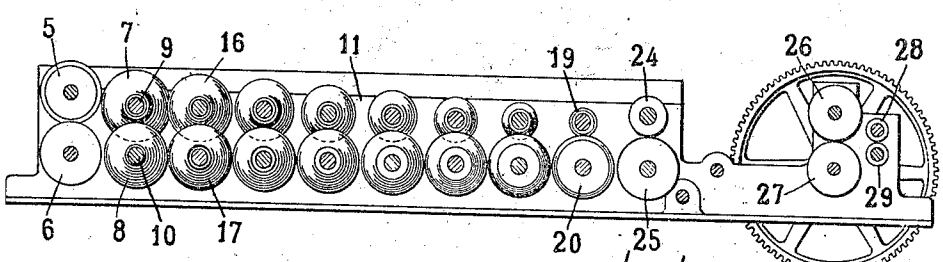


Fig. 3.

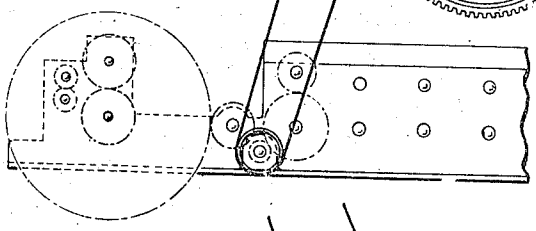


Fig. 2.

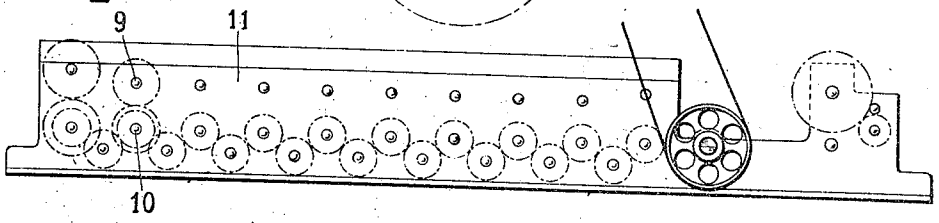


Fig. 4.

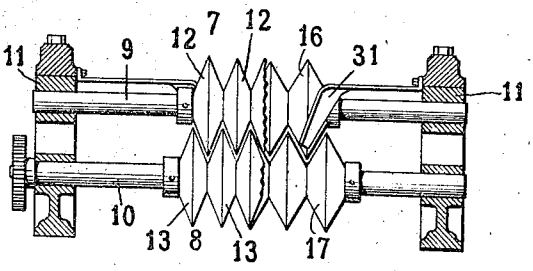


Fig. 5.

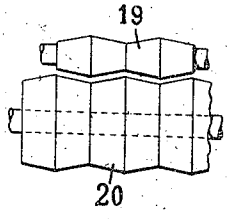
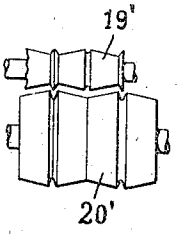


Fig. 6.



WITNESSES

J. Clyde Tapley.

Philip L. McLean.

INVENTOR

Norris Elmore Clark,

BY

ATTORNEY

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2 SHEETS—SHEET 2.

Fig. 14.

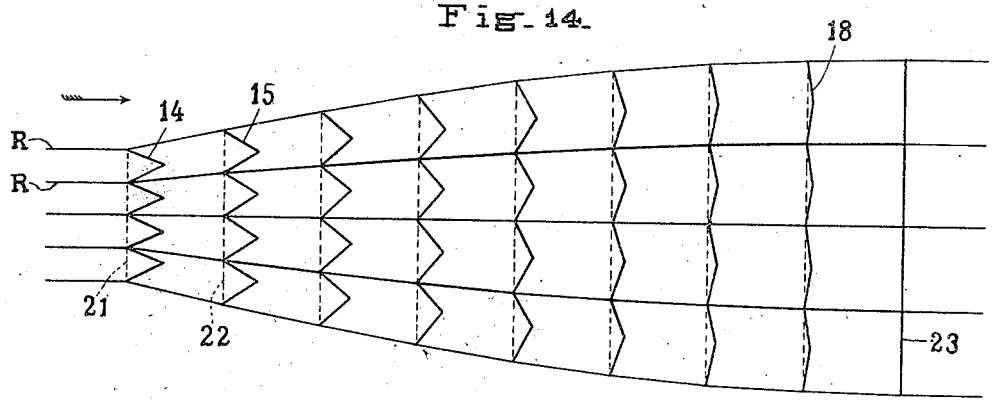


Fig. 15.

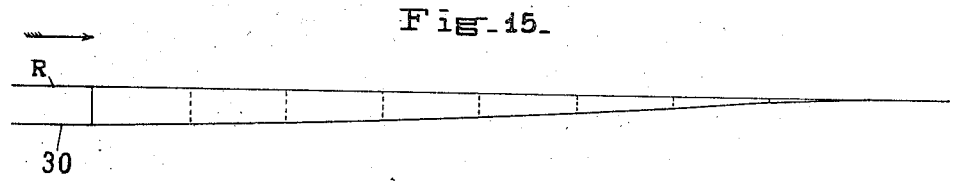
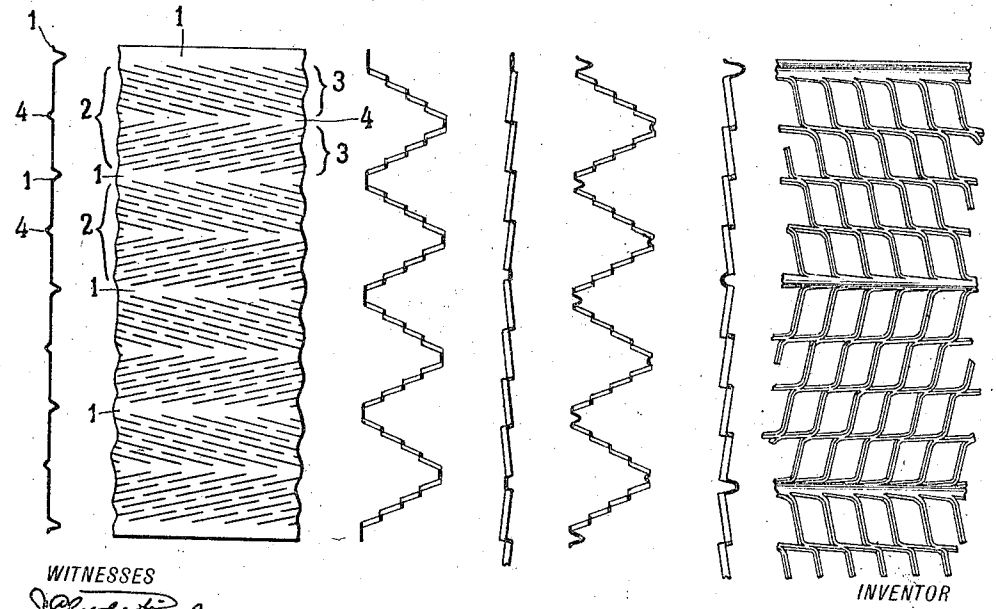


Fig. 8. Fig. 7. Fig. 9. Fig. 10. Fig. 11. Fig. 12. Fig. 13.



WITNESSES

J. Clyde Tingley.

Philip S. McLean.

INVENTOR

Norris Elmore Clark,

BY

ATTORNEY

UNITED STATES PATENT OFFICE.

NORRIS ELMORE CLARK, OF PLAINVILLE, CONNECTICUT.

METAL-WORKING.

1,146,552. Specification of Letters Patent. Patented July 13, 1915.

Application filed February 11, 1913. Serial No. 747,643.

To all whom it may concern:

Be it known that I, NORRIS ELMORE CLARK, a citizen of the United States of America, and residing at Plainville, in the county of Hartford and State of Connecticut, have invented new and useful Improvements in Metal-Working, of which the following is a specification.

My invention relates particularly to the manufacture of what is commonly termed expanded metal.

The object is to provide a simple and inexpensive mechanism for expanding slitted sheets at high rate of speed in a uniform manner and without injuring the stock.

In its preferred form, the invention contemplates mechanism for acting upon a previously slitted sheet of metal which is corrugated longitudinally and opening out certain of the corrugations as the sheet is moved through the machine.

Figure 1, is a longitudinal view showing the ends of a series of rolls for acting upon the material according to my invention. Fig. 2, shows the arrangement of gearing on one side of the machine diagrammatically. Fig. 3, shows the arrangement of gearing on the other side of the machine diagrammatically. Fig. 4, is a view at the receiving end of the machine, parts being broken away. Fig. 5, is a similar view showing parts of one of the last pairs of rolls for spreading the stock. Fig. 6, is a similar view of a corresponding pair of rolls of slightly different form. Fig. 7, is a fragmentary view showing one arrangement of slitting. Fig. 8, is an end view of a sheet with longitudinal corrugations in the unslitted portions. Fig. 9, is an end view of a sheet corrugated longitudinally so as to form mesh work. Fig. 10, is an end view of part of the same spread out into a relatively flattened sheet. Fig. 11, is an end view of a sheet in which the unslitted portions are longitudinally corrugated as in Fig. 8, and the slitted portions are opened into mesh work by a longitudinally corrugating action. Fig. 12, is an end view (on a somewhat larger scale) of part of the same shown spread out into a relatively flat sheet. Fig. 13, is a fragmentary view of one form of fabric expanding according to my invention. Fig. 14, is a diagrammatic plan view indicating the method of expansion according to my invention and showing the relative shape of the cross section of a sheet at the different stages of its progress through the machine. Fig. 15, is a diagrammatic side view showing the relative flattening of a sheet.

The sheet is preferably first slitted as shown in Fig. 7 so that it consists of unslitted strips or ribs such as 1, 1 connected by slitted portions such as 2, 2. The slitted portions are expansible and the slitting is in any suitable arrangement but preferably as shown. Each slitted section may have two parts such as 3, 3 united midway between the strips 1, 1, for instance along the strip 4. The sheet may be corrugated longitudinally along the unslitted strips as shown at 1, 1 and 4, 4 Fig. 8 if desired either in preliminary treatment or by rolls such as 5 and 6 in Fig. 1. These rolls engage the strips 1, 1 and feed the slitted sheet into the machine.

The slitted portions are subjected to a longitudinal corrugating action in a previous treatment as shown by my Patent #1,052,888 or in my application #741,376 filed January 11, 1913, or by means of rolls such as the rolls 7 and 8 so that the end view would appear as in Figs. 9 or 11, the particular sections depending upon whether or not the unslitted strips are corrugated. The rolls 7 and 8 will feed the stock into the machine even if the rolls such as 5 and 6 are not used.

Rolls 7 and 8 are made up of shafts such as 9 and 10 supported by suitable housing such as 11 and having a series of disks such as 12, 12 and 13, 13 which intermesh and provide between them a passage corresponding to the shape of the cross section of the stock at this point as shown for instance by the zig-zag line 14 in Fig. 14. The zig-zag line 15 represents diagrammatically the cross section of a passage between the rolls 16 and 17. The zig-zag line 18 represents diagrammatically the cross section of the passage between the rolls 19 and 20 and the intermediate zig-zag lines in Fig. 14 represent the cross sections of the passages between the other successive rolls. The lines R, R represent the ribs or longitudinal unslitted strips such as 1, 1 of Fig. 7. The dotted lines such as 21 and 22 represent the positions of the successive rolls. The full line 23 represents the relatively flat sheet of expanded metal at the point as it passes through between the rolls 24 and 25. The rolls 26 and 27, 28 and 29 serve to iron out

and smooth the stock by relieving internal stresses in the metal and distributing the strain uniformly so as to produce perfectly flat product, that is a product without buckles or irregularities. These rolls also serve to feed the product out of the machine.

It will be noted that according to the arrangement and relative proportions of the rolls and their spreading disks, the corrugated stock at the beginning of the spreading actions is operated on rather abruptly but this does not injure the stock as it is at this point very flexible laterally. As the stock is widened out however, it becomes laterally less flexible and for this reason the longitudinal unslitted strips or ribs are brought out into their proper relative position more gradually so that the curve which they take is substantially tangential to their final position in the finished sheet. It will also be noted that while the longitudinal strips or ribs R travel in a substantially horizontal plane through the machine, the intermediate portions, strips or ribs, as the case may be, as indicated at 30 gradually rise as they move outward so as to subject the stock to as little stress as possible. Directing guides such as 31 may be employed between the successive pairs of rolls. The shape of the cross section of the successive rolls also depends upon the results which it is desired to produce and it should be understood that many modifications in details of construction and arrangement of parts may be made without departing from the spirit or scope of my invention.

The rolls 19′ and 20′ of Fig. 6 are ribbed and grooved respectively to treat a fabric having grooved unslitted longitudinal strips such as is shown in Figs. 11 and 12. If the longitudinal strips are grooved by rolls such as 5 and 6 at the entrance to the machine, the other rolls will be ribbed and grooved as indicated in Fig. 6, to allow for the longitudinal corrugations or the longitudinal strips may be lorgitudinally corrugated by means of the rolls such as shown in Fig. 6.

All of the lower rolls of the machine and some of the upper rolls are power driven as indicated by the dotted gear pitch lines in Figs. 2 and 3 and thus exert a tractive or feeding force on the stock throughout the entire machine.

What I claim is:—

1. In an expanded metal machine, means for feeding in stock composed of oppositely inclined meshwork sections with marginal and intermediate longitudinal unslitted strips, a series of diverging trains of spreading devices, each train of spreading devices consisting of upper and lower members with a pass at the entrance end having oppositely inclined halves for meshwork sections, the adjacent halves of adjacent passes being slightly spaced apart for the unslitted strips and oppositely inclined at the entrance end, all of the passes gradually changing in cross sectional shape and becoming flatter from the entrance toward the exit and means for feeding out the product.

2. In an expanded metal machine, a pair of feeding-in rolls, intermeshing disks mounted adjacent thereto and having a pass of zig-zag outline for meshwork sections, delivery rolls at the opposite end of the machine and diverging trains of devices located between the intermeshing disks and said delivery rolls for gradually spreading the meshwork sections.

3. In an expanded metal machine, a plurality of trains of disks diverging from the entrance toward the exit for receiving a sheet of stock composed of oppositely inclined meshwork sections and spreading the said sections into a common plane and directing guides between successive disks of the outer trains of disks.

4. In an expanded metal machine, a pair of entrance feeding rolls having a pass suitable for receiving a deeply corrugated expanded meshwork having longitudinal tension members, a plurality of trains of devices diverging from said entrance rolls for progressively separating the said longitudinal members and spreading all the meshwork into a common plane.

5. In an expanded metal machine, a series of rows of means arranged on diverging lines for engaging longitudinal unslitted strips of a corrugated sheet and gradually bending the reticulated sections between the longitudinal strips into a common plane and a plurality of rolls for ironing out the product and setting the reticulated sections in a definite plane.

6. In an expanded metal machine, a pair of rolls having a plurality of pairs of intermeshing disks for receiving a corrugated reticulated fabric, a pair of rolls for setting the reticulated sections in a common plane and a plurality of rows of means arranged between said receiving and setting rolls for gradually spreading the sheet and bringing the reticulated sections into a common plane.

7. In an expanded metal machine, a pair of rolls having intermeshing disks for receiving a corrugated reticulated fabric, a pair of rolls for setting the reticulated sections in a common plane, and a series of pairs of rolls with intermeshing disks arranged between the receiving and setting rolls, the contours of said disks being formed so as to gradually spread the sheet and bring the reticulated sections into a common plane.

8. In an expanded metal machine, a series of means arranged on diverging lines for engaging longitudinal strips of a corrugated reticulated sheet, means for corrugating said strips, a series of means for gradually bend-

ing the reticulated sections between the longitudinal strips into the same plane with said strips and means for feeding out the product.

9. In an expanded metal machine, a series of means arranged on diverging lines for engaging longitudinal strips of a corrugated reticulated sheet, means for corrugating the strips, a series of means for gradually bending the reticulated sections between the longitudinal strips into the same plane with the bases of said strips and a plurality of rolls for ironing out the product and setting the reticulated sections in a definite plane.

10. In an expanded metal machine, a pair of rolls having intermeshing disks for receiving a corrugated reticulated fabric having longitudinal strips, a pair of rolls for delivering the product, means arranged between said receiving and delivery rolls for gradually spreading the sheet and bringing the reticulated sections into a common plane and means for corrugating the strips of the fabric.

11. In an expanded metal machine, a pair of rolls having intermeshing disks for receiving a corrugated reticulated fabric, a pair of rolls for setting the reticulated sections in a common plane, and a series of pairs of rolls with intermeshing disks arranged between the receiving and setting rolls, the contours of said disks being formed so as to gradually spread the sheet and bring the reticulated sections into a common plane, the tops of the lower rolls being all on a common plane.

12. In an expanded metal machine, a pair of shafts at one end with intermeshing disks providing a pass of zig-zag cross section for receiving a corrugated expanded sheet, a pair of rolls at the opposite end for setting all of the meshwork in the same general plane and rolls located between said receiving disks and said setting rolls for gradually spreading the stock.

13. In an expanded metal machine, a plurality of trains of spreading disks with two sets of diverging guiding surfaces for engaging unslitted strips of a corrugated meshwork, the guiding surfaces of alternate sets being in separated parallel planes at the entrance end of the machine and all the guiding surfaces of both sets being in substantially the same plane at the exit end for progressively spreading the meshwork and strips into a common plane.

14. In an expanded metal machine, a plurality of pairs of disks arranged to receive a corrugated meshwork having longitudinal unslitted strips arranged alternately in parallel planes and connected by inclined meshwork sections and a plurality of trains of rolls for bringing all the meshwork sections into a common plane.

NORRIS ELMORE CLARK.

Witnesses:
E. E. DANIELS,
EDWARD C. ASPINWALL.