

April 19, 1938.

L. W. CROSS

2,114,592

TREATMENT OF EXPANDED METAL

Filed July 23, 1935

2 Sheets-Sheet 1

Fig. 1.

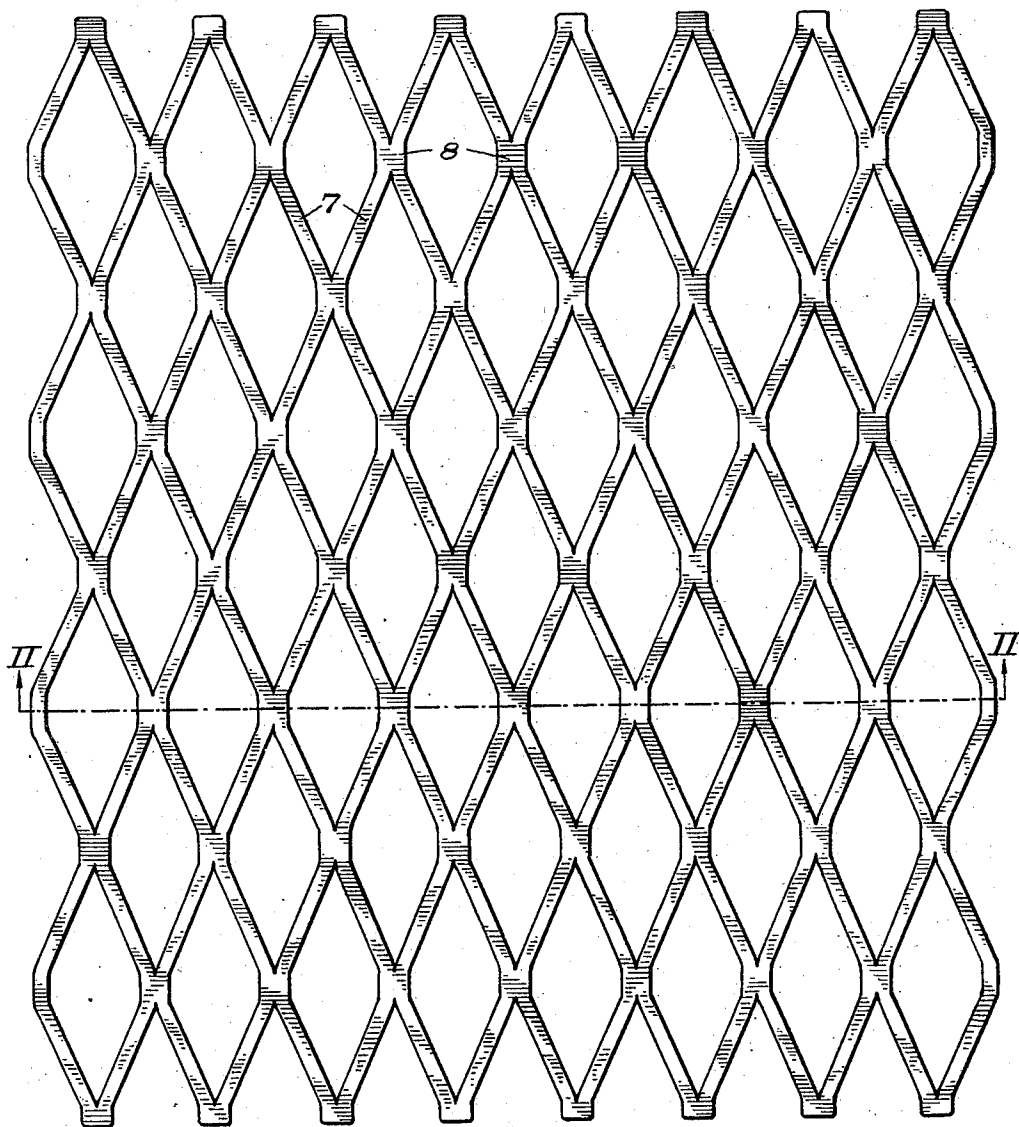
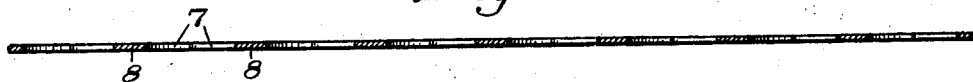


Fig. 2.



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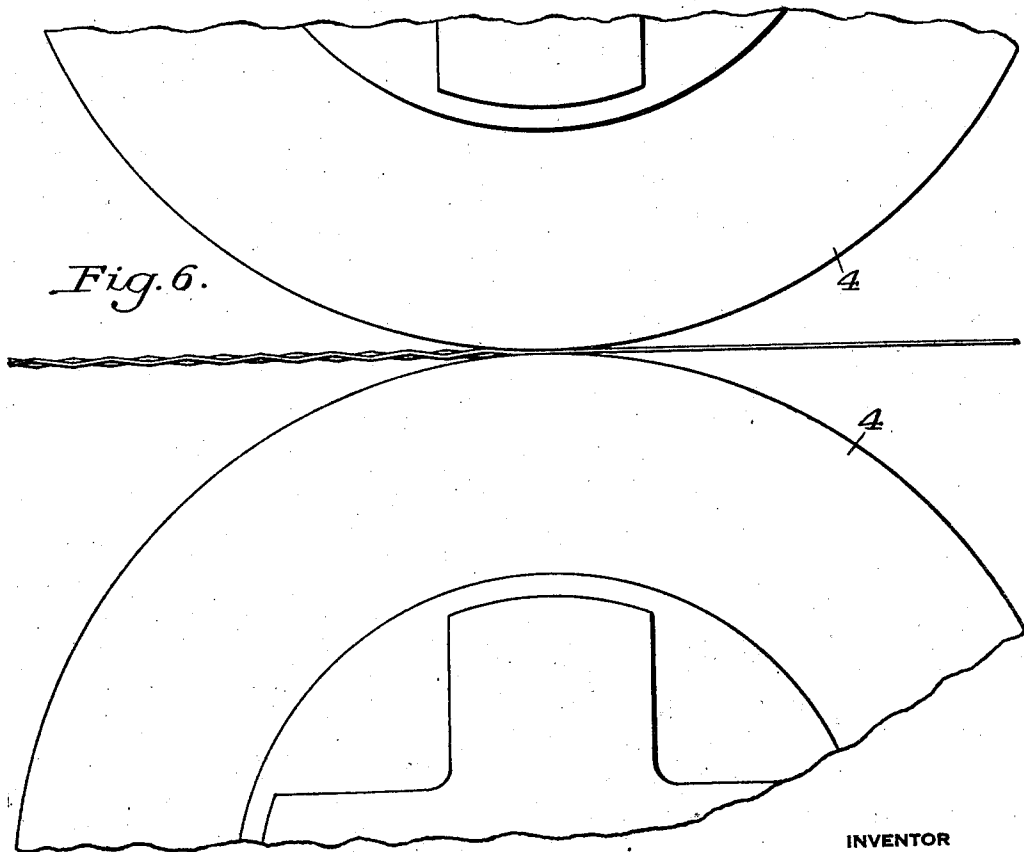
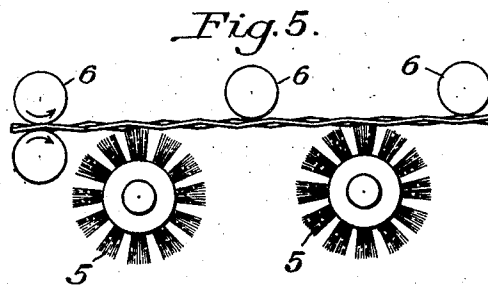
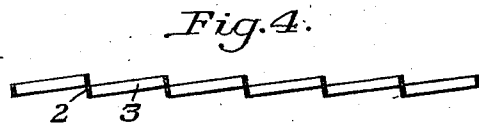
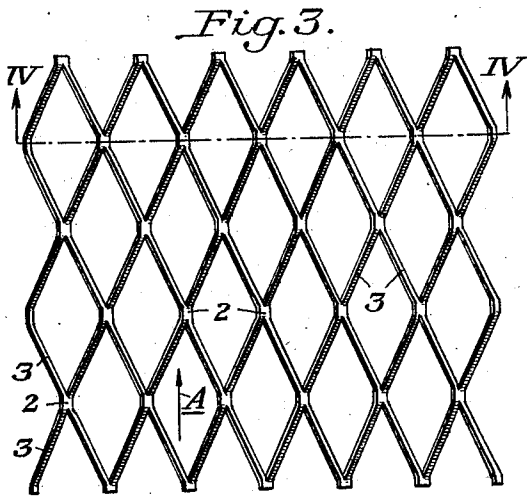
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TREATMENT OF EXPANDED METAL

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,114,592

TREATMENT OF EXPANDED METAL

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Application July 23, 1935, Serial No. 32,701

3 Claims. (Cl. 164—6.6)

This invention relates broadly to the treatment of expanded metal, and more particularly to the production of flattened expanded metal. It relates still more particularly to certain discoveries in connection with the flattening of expanded metal which result in insuring the production of commercially satisfactory flattened expanded metal.

So-called flattened expanded metal has been known for many years. See, for example, Clark Patent No. 947,794. However, the art of flattening expanded metal has never prior to the present invention been developed to the point of insuring the production of a commercial product. The so-called flattened expanded metal heretofore produced has not been suitable for uses requiring smooth, truly flat, finished material where the expanded metal is exposed to view. In point of fact, it has not been smooth or finished in appearance and it has been used, so far as I am aware, only for reinforcing or similar purposes where a high degree of smoothness and flatness and a finished appearance are not required and where the expanded metal is not exposed to view. Unless the principles herein set forth are followed, any attempts at flattening may result in the material tending to curl or corkscrew, requiring further treatment in order to get it commercially flat, or a product having unlike faces may result, which renders it unsatisfactory for many purposes. Again, the strands and bonds may not be properly turned down into a common plane or irregularities may appear on one or both sides of the flattened product such as at the bonds or at the junctions of the strands and bonds.

It is not feasible to produce commercially flattened expanded metal by the methods heretofore utilized for use as exposed finished material. So far as I know, flattened expanded metal suitable for such purposes was never a commercial product until my discoveries herein described and claimed were made. By the use of the principles herein set forth, I have produced flattened expanded metal on a commercial scale with a wastage from improper flattening which to all intents and purposes is negligible.

I have found that certain relationships must exist between the dimensions of the strands of the expanded metal and the reductions employed in flattening if a uniform commercial product is to be produced. If these relationships are not followed, at least a substantial portion of the product, and possibly all of it, will not be usable

for certain purposes for which the flattened expanded metal may be intended. For example, flattened expanded metal is now coming into wide use for shelving, such as refrigerator trays. Expanded metal to be used in a refrigerator tray should have both surfaces substantially uniform so that it may be assembled to the frame with either side up; it should be substantially perfectly flat to permit large and small objects to be slid over its surface without upsetting; and it should be free from small depressions in its faces which would serve to catch foreign matter and render the tray unsanitary.

I have found that the reduction employed in flattening expanded metal should be such as to thin and widen the strands and increase the ratio of the width to the thickness of the strands at least about $\frac{1}{3}$ and preferably, and especially when the original ratio of strand width to strand thickness is in the neighborhood of 1, at least about $\frac{1}{2}$. Expanded metal should be used the initial ratio of the width to the thickness of whose strands is at least 1, and the ratio of the width to the thickness of the strands of the flattened product should be at least 1.5. When the initial ratio of the width to the thickness of the strands is greater than 1.25 the increase in such ratio which accompanies the insured production of a satisfactory commercial product need not be as great as when the initial ratio is somewhat less, but should in any event be at least about $\frac{1}{3}$. I find that by far the best results are obtained by observing the relationships above mentioned while subjecting the expanded metal to cold rolling.

Other details, objects and advantages of the invention will become apparent as the following description of certain present preferred methods of practicing the same proceeds.

In the accompanying drawings I have illustrated diagrammatically certain present preferred methods of practicing the invention and have shown sheets of expanded metal before and after flattening by my process, wherein

Figure 1 is a plan view of a piece of commercially uniform flattened expanded metal;

Figure 2 is a vertical transverse cross-sectional view taken on the line II—II of Figure 1;

Figure 3 is a top plan view of a piece of expanded metal before flattening;

Figure 4 is a vertical transverse cross-sectional view taken on the line IV—IV of Figure 3;

Figure 5 is a diagrammatic view illustrating the brushing of the expanded metal; and

Figure 6 is a diagrammatic view illustrating the flattening thereof.

The expanded metal shown in Figures 3 and 4 may be formed in any well known manner, as by the deploying or the guillotine method. Such expanded metal comprises bonds 2 and strands 3, the strands being connected at their ends by the bonds. The strands and bonds are inclined to the plane of the sheet, due to the method of formation, as shown in Figure 4.

In Figure 6 the expanded metal is shown as being flattened between rolls 4 which are preferably relatively large heavy rolls such as are used for the cold rolling of thin sheet metal. The strands and bonds are turned down into the plane of the sheet and are reduced in thickness and the strands are widened. The ratio of the width to the thickness of the strands should be increased during the rolling at least about $\frac{1}{3}$. When the initial ratio is in the neighborhood of 1, such ratio should preferably be increased at least about $\frac{1}{2}$. When the initial ratio is greater than about 1.25 increase in the ratio of at least about $\frac{1}{3}$ will insure the production of the desired uniform commercial product. Expanded metal the ratio of the width to the thickness of whose strands is at least 1 is preferred and best results are obtained when it is used. The ratio should be increased to at least 1.5.

Examples of the carrying out of my process will show what relationships have been maintained with satisfactory results. Expanded metal having square strands .065" x .065", and thus having a ratio of strand width to strand thickness of 1, was reduced so that its strand thickness was .049" and its strand width .078", or a ratio of strand width to strand thickness of about 1.6. This represents an increase in the ratio of strand width to strand thickness of somewhat more than $\frac{1}{2}$. Expanded metal having an initial strand thickness of .0625" and an initial strand width of .089" or a ratio of strand width to strand thickness of approximately 1.4 was reduced until the strand thickness became .051" and the strand width .105", or a ratio of strand width to strand thickness of 2.1, or an increase of $\frac{1}{2}$. Expanded metal having an initial strand thickness of .0625" and an initial strand width of .105" or a ratio of 1.7 was flattened to a strand thickness of .049" and a strand width of .133" or a ratio of 2.7. Here the increase in ratio was somewhat more than $\frac{1}{2}$. However, as indicated above, the desired results can be obtained with a somewhat lower increase in the ratio of strand width to strand thickness when the initial ratio is relatively high and when such ratio is above 1.25 an increase of about $\frac{1}{3}$ is sufficient to obtain the desired results. For example, I have produced satisfactory flattened expanded metal by cold rolling metal having strands originally .0625" in thickness and .096" in width and reducing the thickness of the strands to .062" and increasing their width to .106". The initial width:thickness ratio was approximately 1.5 and the final ratio approximately 2.0 or an increase in the width:thickness ratio of $\frac{1}{3}$.

The expanded metal may be brushed as indi-

cated diagrammatically in Figure 5, in which revolving wire brushes 5 and guide rolls 6 are shown, which brushing may be carried out as described and claimed in my United States Patent No. 1,950,372. The brushing is preferably carried out in the direction of the arrow A of Figure 3.

The flattened expanded metal is shown in Figures 1 and 2, the strands and bonds being reduced in thickness and being of substantially uniform thickness throughout. The strands are indicated at 7 and the bonds at 8. The flattened expanded metal produced in accordance with my process has a substantially perfectly smooth uniform surface which is for all practical purposes the same on both sides of the expanded metal and both surfaces are free from local or extended irregularities such as would prevent the sliding of relatively small objects over the expanded metal when used as a tray without tipping of such objects or result in the accumulation of foreign matter at the surface of the tray. When my improved process is used the expanded metal issuing from the rolls does not curl or corkscrew but comes out flat and even.

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

I claim:

1. The method of making flattened expanded metal which comprises first forming a sheet of expanded metal having bonds and strands which are inclined to the plane of the sheet and the strands having a width:thickness ratio of at least 1, and thereafter cold rolling the sheet so as to turn the bonds and strands into the plane of the sheet while widening them so as to increase the width:thickness ratio of the strands at least about $\frac{1}{3}$ and to a width:thickness ratio of at least 1.5.

2. The method of making flattened expanded metal which comprises first forming a sheet of expanded metal having bonds and strands which are inclined to the plane of the sheet and the strands having a width:thickness ratio between about 1 and 1.25, and thereafter cold rolling the sheet so as to turn the bonds and strands into the plane of the sheet while widening them so as to increase the width:thickness ratio of the strands at least about $\frac{1}{2}$.

3. The method of making flattened expanded metal which comprises first forming a sheet of expanded metal having bonds and strands which are inclined to the plane of the sheet and the strands having a width:thickness ratio greater than 1.25, and thereafter cold rolling the sheet so as to turn the bonds and strands into the plane of the sheet while widening them so as to increase the width:thickness ratio of the strands at least about $\frac{1}{3}$.

LEONARD W. CROSS.