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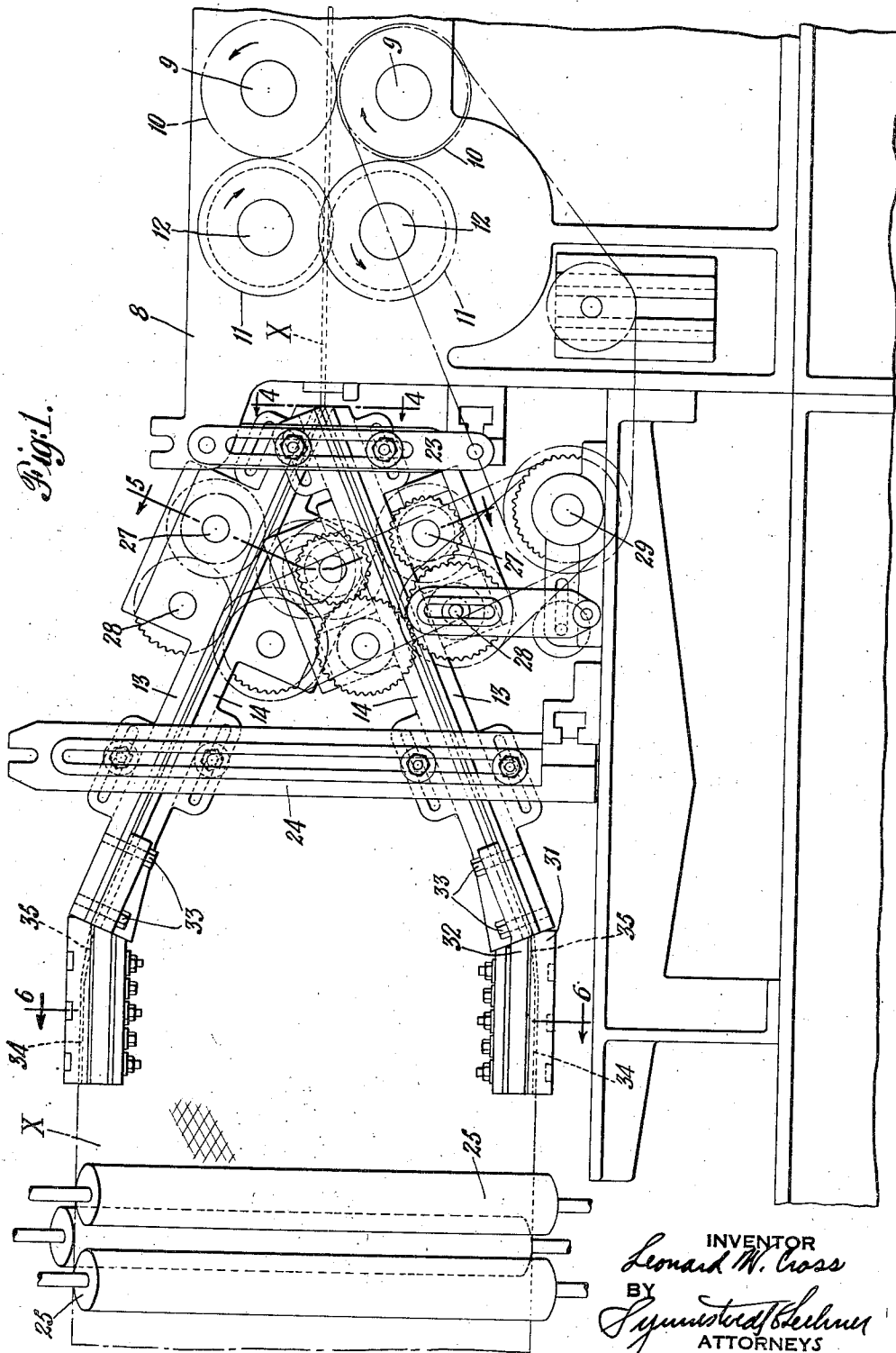
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2,106,967

APPARATUS FOR MANUFACTURING EXPANDED METAL

Filed Aug. 1 1934

3 Sheets-Sheet 1



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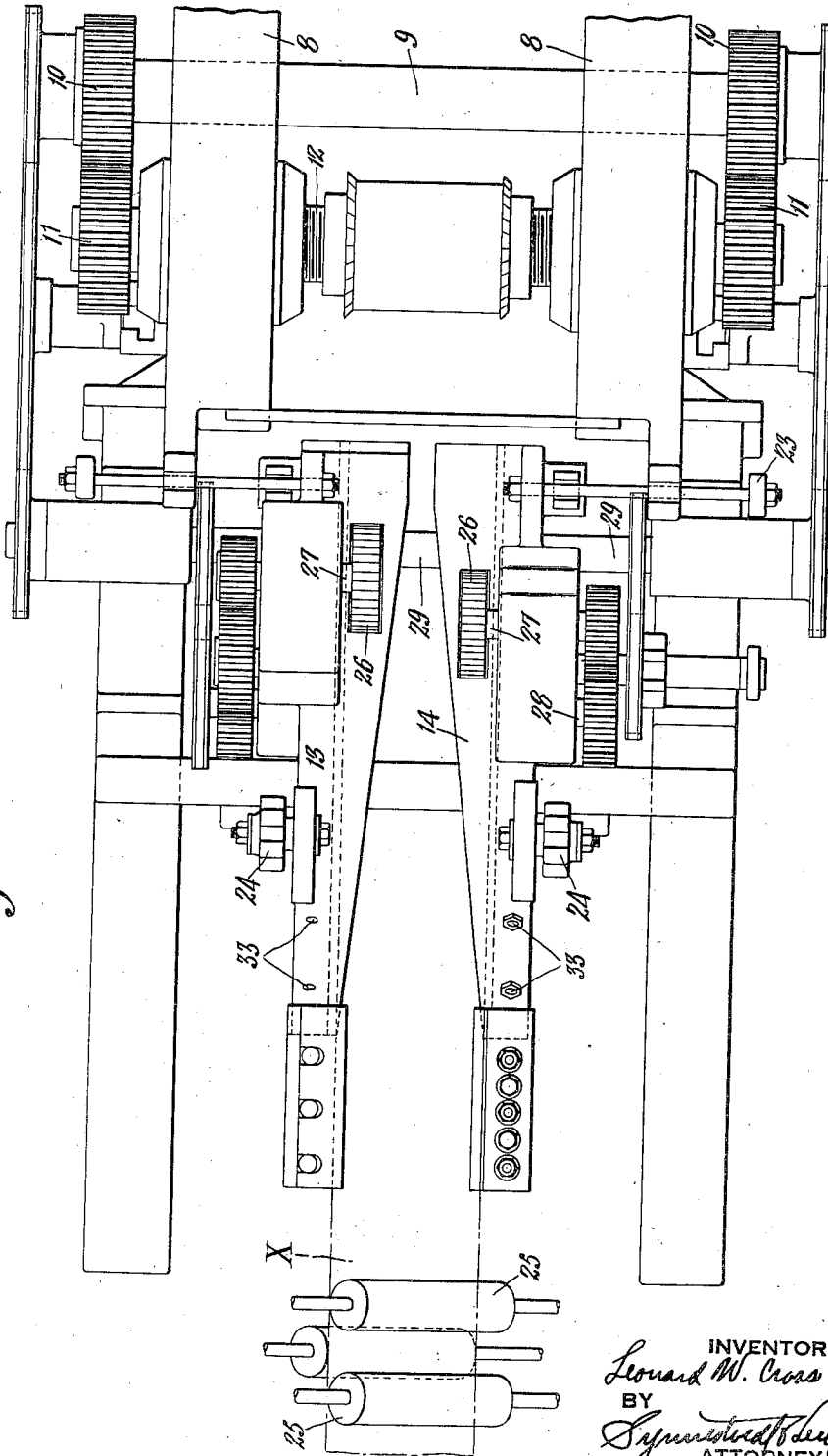
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APPARATUS FOR MANUFACTURING EXPANDED METAL

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3 Sheets-Sheet 2



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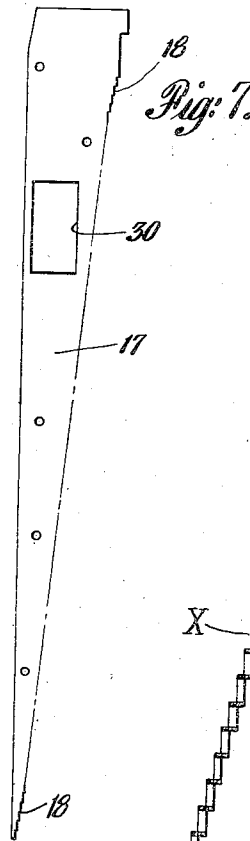
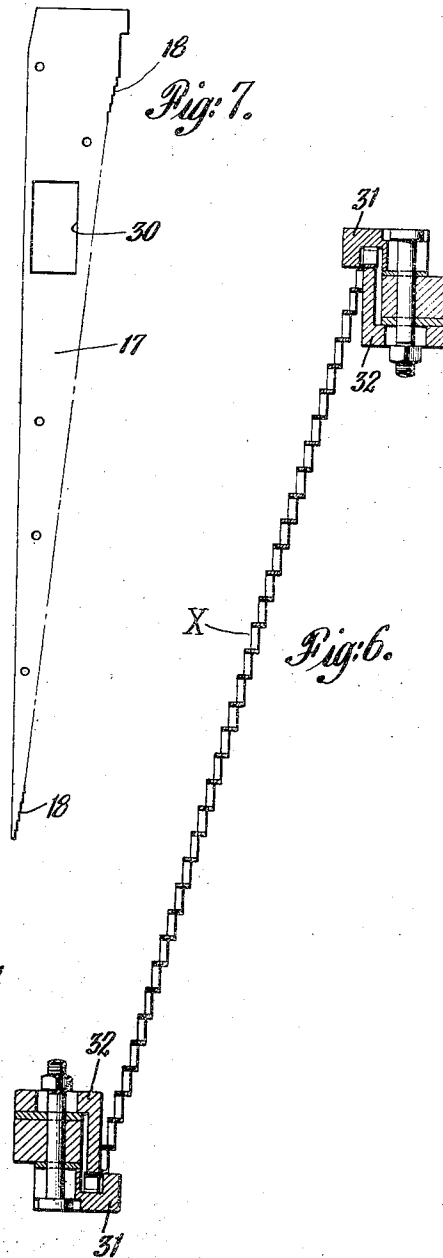
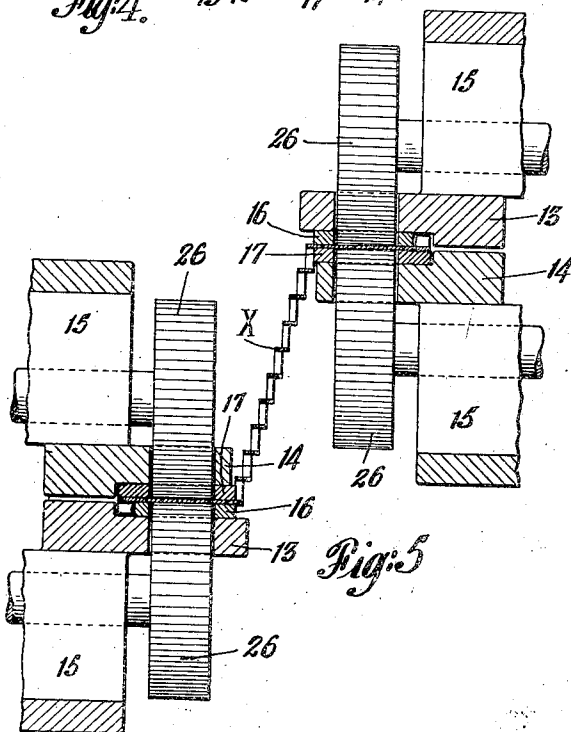
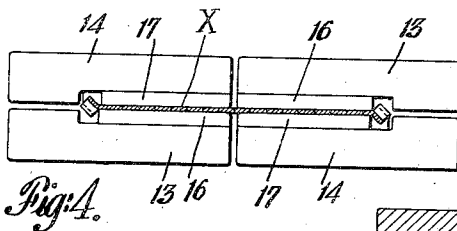
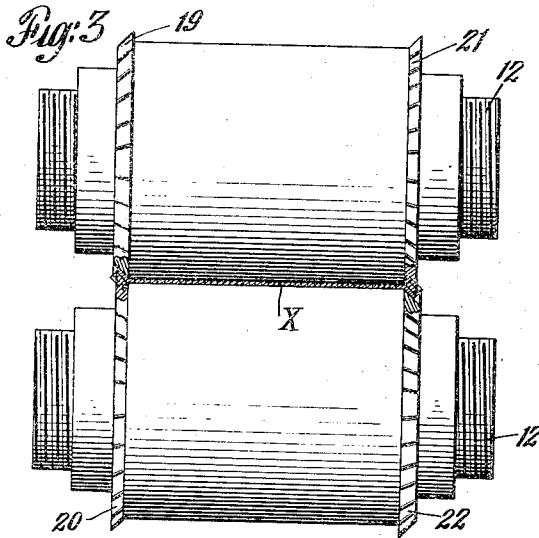
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APPARATUS FOR MANUFACTURING EXPANDED METAL

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3 Sheets-Sheet 3



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APPARATUS FOR MANUFACTURING EXPANDED METAL

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5 Claims. (Cl. 164—6.6)

This invention relates to apparatus for manufacturing expanded metal meshwork and is especially concerned with expander mechanism which is particularly adapted to expand relatively small mesh material such as the so-called Diamond mesh lath.

One of the chief objects of the invention is to provide an expander mechanism which produces an improved quality product. More specifically the invention is concerned with the successful and effective production of expanded metal, especially of the small mesh type, in sheets of very regular and uniform dimensions.

A disadvantage of prior practice has been overcome by this invention, as follows: the sheets of meshwork or lath produced by present known mechanisms very frequently are irregular in shape. One common irregularity has heretofore occurred in the side edges of the sheets, in that they have frequently been curved inwardly intermediate the ends of the sheet. This, of course, makes for difficulty and inconvenience in installation since when applying the sheets to a wall, adjacent side edges cannot accurately be aligned so that it has been necessary either to leave some small space between certain portions of adjacent sheets or to overlap adjacent sheets. Both of these expedients are obviously undesirable and, by means of the apparatus presently to be described, this invention has completely overcome the difficulty.

The invention is also concerned with avoiding difficulties which have heretofore arisen by way of breakage or tearing of the sheets, particularly adjacent the side edges.

Still further the invention makes practicable the production of expanded metal having smaller meshwork openings than heretofore. Such small-mesh fabric is desirable, especially as a plaster base for the reason that there is less wastage of plaster and at the same time an improved bond between the plaster and lath.

Other objects and advantages will appear more fully after a consideration of the following description which makes reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a mechanism constructed in accordance with this invention;

Figure 2 is a plan view of the apparatus;

Figure 3 is an enlarged view of "setter rolls" employed;

Figure 4 is a cross sectional view through expander guide devices which are used, the view being taken toward the entrance ends of the

guides as indicated by the section line 4—4 on Figure 1;

Figure 5 is a sectional view through the expander guides taken on the line 5—5 of Figure 1;

Figure 6 is a view similar to Figures 4 and 5 but taken as indicated by the line 6—6, and

Figure 7 is a view of a guide member which I prefer to employ.

Before discussing the several features of the equipment, it is pointed out that the mechanism, as a whole, is of a type employing divergent guides adapted to engage marginal portions of a sheet to be expanded, through which guides slitted sheets are advanced for the purpose of opening out the meshes. An example of a mechanism of this general type appears in the prior Reissue Patent No. 16,504 of December 14, 1926 to Salmon et al., and the present invention is concerned with a number of improvements to this general type of mechanism. It might further be mentioned that this general type of machine for producing lath has a number of advantages over other types, especially in that continuous operation and feed of the sheets is provided and also in that a convenient and effective rotating type of slitter means is utilized.

A further consideration which should be borne in mind is that prior machines of the type here under consideration have been subject to a number of disadvantages which impaired their general usefulness. Heretofore (for example, as shown in the reissue patent mentioned above) a pair of cooperating rotary slitters were employed, each slitter being composed of a multiplicity of circular knives which were notched at intervals to leave the strand interconnecting bonds and thus form the mesh. The slitted blanks were fed from these rotary slitters through the divergent expander guides and in order to pull the metal through the guides, "pin wheels" were used at the delivery ends thereof. Each pin wheel carried a plurality of pins at its periphery, these being spaced from each other in a certain and accurate relationship to the size of the meshwork openings in the material being produced.

It is now pointed out that the size of the meshwork openings is determined by the slitters, i. e., by the length of the slits produced. The slitters must be sharpened relatively frequently and each time the edges of the circular knives are ground for this purpose, the knives are reduced in diameter and this changes the peripheral distance between the notches in the knives and thus also shortens the length of the slits formed.

Thus it will be seen that in accordance with

prior machines of the general type to which this invention relates, the necessary successive re-grinding of the slitter knives changed the size of the meshwork openings formed and this change resulted in improper "fit" of the pins carried by the pin wheels. It was attempted to provide a mean for adjusting the positions of the pins in conformity with the shortening of the slits resulting from sharpening the circular slitter knives. This, however, considerably multiplied adjustments, which is obviously highly undesirable. In addition, it has been found very difficult and troublesome to keep the pin wheels properly timed with other rotating rolls of the mechanism, as a result of which breakage of strands was frequently caused by irregular or jerky feed as the sheets passed through the machine.

The equipment of the present invention completely overcomes this difficulty, it being noted that the pin wheels are eliminated and entirely different means employed for drawing the slitted sheets through the expander guides.

With the foregoing considerations in mind, attention is now directed to the drawings. As seen in Figures 1 and 2, spaced supports or framing 8 serves to carry a number of shafts, gears and driving devices including shafts 9 which are coupled by means of gears 10 and 11 with additional shafts 12 carrying the setter rolls which are mentioned herebelow in connection with Figure 3. The framing 8—8 also serves to support the slitter rolls which are not shown herein but which are positioned just to the right of the portions of the equipment appearing in Figures 1 and 2. These slitter rolls themselves form no part of the present invention per se, although it might be mentioned that the blank sheets are first fed through the slitter rolls and from there through the setter rolls, following which they are delivered to the entrance ends of the expander arms or guides now to be described.

As viewed in Figure 1 the expander guides diverge from each other upwardly and downwardly which is in a direction generally transverse to the plane of the sheets (indicated at "X") as they pass through the slitting and setter rolls. The upper and lower expander arms are essentially of the same construction, although they occupy relatively inverted positions. As seen to best advantage in Figures 4 and 5, each of these guides includes a pair of members 13 and 14 which may conveniently be supported as by the fixed parts 15. A pair of additional members 16 and 17 are received between the elements 13 and 14 and in considering the formation of the members 17 reference is made to Figure 7 which illustrates in plan one of such members as being generally of tapered shape, although one edge is provided with a plurality of small shoulders or steps 18. The cooperating guide member 16 need not necessarily be provided with such shoulders. The guide members 16 and 17 are supported by and positioned between the arms 13 and 14 in spaced relation and further have their relatively wide ends positioned at the entrance ends of the guides from which they taper toward the delivery ends, as will be apparent from a comparison of the showing in Figures 4 and 5.

As the blanks are advanced through the guides it will be seen that portions thereof are successively uncovered or released for purposes of expansion. More specifically, each time an additional one of the shoulders 18 is passed, an ad-

ditional strand is released for expansion. During this expanding action the sheet is subjected to a very substantial pull transversely thereof and in order to prevent this force from pulling the sheets out of the guides, the margins of the sheets are deformed and provision is made in the guides for engaging the deformed margins. For this purpose, the setter rolls already mentioned above and shown in more detail in Figure 3 carry cooperating disks 19—20 and 21—22 which are so formed as to give the opposite side edges counterpart deformations of the character appearing in Figures 3 to 6 inclusive. These deformed edges are received in grooves or recesses provided between the guide members 13 and 14 of each expander arm along the outer edges of the members 16 and 17. This grooved formation of the expander guides and the deformation of the side edges of the sheets serve to prevent lateral pulling out of the sheets during the expanding operation.

Intervening between the members 19 and 21 on the upper roll appearing in Figure 3 and also between the members 20 and 22 on the lower roll of the same figure, a multiplicity of setter disks are stacked and these disks have complementary indentations and projections which serve to cock or twist the strands produced in the slitting operation which precedes, the purpose being to facilitate subsequent opening of the meshes. This feature, however, forms no part of the present invention per se and the structure of the setter devices is, therefore, not shown in detail herein, nor is the exact cross sectional shape of the sheet shown in the several figures since this also is not necessary to a complete understanding of the present improvements.

Turning again to the showing of Figures 1 and 2, the expander arms are supported in their proper angular positions preferably by adjustable means such as the slotted support 23 toward the entrance ends of the guides and the additional slotted upright 24 positioned toward the delivery ends.

A major feature of this invention is involved in the provision of fixed guide extensions at the ends of the divergent guides already described. These additional guiding elements appear in Figures 1, 2 and 6. Here, again, the elements of each one of the guide extensions are essentially similar, although they occupy relatively inverted positions. As seen in Figure 6 a pair of guide members 31 and 32 cooperate to provide a groove or recess configured to receive the deformed margins of the sheets. These guide members may conveniently be secured to each other as suggested in Figure 6 and also supported as by studs 33 taking into portions of the divergent expander arms. Another point to be mentioned is that, as shown in Figure 1, the grooves provided between the pairs of guide elements 31 and 32 preferably have portions 34 which are extended parallel to each other and also parallel to the direction of movement of the sheets as they are withdrawn from the expanding equipment by the rolls 25. The grooves just mentioned further preferably have portions 35 which are angled slightly so as to change the direction of movement of the margins of the sheets as they emerge from the divergent expander arms relatively gradually until the parallel portions 34—34 of the grooves are reached.

Another feature of the present invention is a new means for advancing the slitted sheets through the expander guides. Generally considered this means preferably includes two roller

mechanisms one of which is effective to grip and advance the sheets at a point intermediate the ends of the divergent guides and the other of which is effective to grip and advance the sheets beyond the delivery ends of the divergent guides. The latter mechanism takes the form of a plurality of elongated rolls such as shown at 25 in Figures 1 and 2. These may be supported in any convenient manner and are preferably arranged at opposite sides of the expanded sheets in staggered relation (see Figure 2). Furthermore, it is desirable to employ a plurality of these rolls, say, for example, from three or four to nine or ten, so as to provide rather extended engagement of the mesh-work, although with relatively light pressure, so that the strands and strand interconnecting bonds are not flattened to any appreciable extent. The staggering of the rolls also aids in avoiding excessive pressure. The rolls are positively driven and may be provided with any suitable surface such as a knurled metallic surface, fiber or rubber or may even have smooth metal surfaces.

The other feeding mechanism preferably takes the form of a single pair of feed rollers associated with each one of the expander arms. These rollers appear at 26 in Figures 1, 2 and 5 and each one of them is carried by a shaft 27 geared to an additional shaft 28. Sprocket and chain couplings serve to connect shafts 28 with the driven shaft 29 which, in turn, is coupled by additional sprockets and a chain with the shaft 9. In this way a common drive is provided for various of the rotating elements of the mechanism. As best seen in Figures 5 and 7 the guide members 13-14 and 16-17 are apertured at 30 so as to receive the feed rollers and permit them to grip the unexpanded portions of the blanks as they pass through the expander arms. These rollers 26, similarly to the rollers 25, may be provided with any suitable surface for engaging the sheets.

In considering the operation and advantages of my improved equipment it is first noted that the guide extensions discussed just above, particularly the portions thereof having parallel grooves, ensure delivery of expanded sheets whose side edges are straight and also accurately parallel with respect to each other.

In addition to the above the use of the feeding mechanisms herein disclosed, especially in combination with the parallel guide extensions, are particularly effective in producing very uniform and undistorted meshwork sheets. Still further, difficulties heretofore encountered from the use of pin wheels for drawing the sheets out of the divergent guides are completely overcome. In this latter connection it is further pointed out that, with material having relatively small meshwork openings, the amount of expansion, i. e., the force required to open all the meshes is greater than with products having larger meshwork openings. Prior types of machines, for example, the pin wheel type, have proven highly unsatisfactory in the production of very small mesh fabric, for the reason that the increased expansion force necessary caused tearing of the sheets, especially at the edges. By employing feed rolls beyond the delivery ends of the parallel guides and also feed rollers intermediate the ends of the expander arms, the foregoing difficulties have been overcome and the small mesh material is readily produced in sheets of accurate dimensions and uniform squared shape.

I claim:—

1. Apparatus for expanding slitted blanks including a pair of divergent expander arms adapted to receive a slitted blank and expand the same in a direction generally transverse its original plane; each of said expander arms including a pair of members adapted to receive a blank therebetween, one of said members being stepped or shouldered at a plurality of points lengthwise thereof to provide decreased engagement of the blank from the entrance end of the expander arm to the delivery end thereof, and said members being apertured transversely of the blank engaged thereby, and a pair of cooperating feed rollers mounted in said apertures and positioned to engage the blank to advance it through the expander arm; and additional guide devices arranged at the delivery ends of said expander arms and having grooves adapted to receive the margins of the expanded blanks, the grooves of said additional guide devices being extended generally parallel to each other and to the direction of movement of the expanded sheet as a whole as it is delivered from the expander arms.

2. Apparatus for expanding slitted blanks including a pair of divergent expander arms adapted to receive a slitted blank and expand the same in a direction generally transverse its original plane; each of said expander arms including a pair of members adapted to receive a blank therebetween, one of said members being stepped or shouldered at a plurality of points lengthwise thereof to provide decreased engagement of the blank from the entrance end of the expander arm to the delivery end thereof, and said members being apertured transversely of the blank engaged thereby, and a pair of cooperating feed rollers mounted in said apertures and positioned to engage the blank to advance it through the expander arm; additional guide devices arranged at the delivery ends of said expander arms and having grooves adapted to receive the margins of the expanded blanks, the grooves of said additional guide devices being extended generally parallel to each other and to the direction of movement of the expanded sheet as a whole as it is delivered from the expander arms; and feed rollers positioned to engage the meshwork for discharge thereof from the expander arms to deliver the expanded meshwork through said additional guide devices.

3. In apparatus for expanding a slitted blank having deformed selvages, an expander arm including a pair of members adapted to receive a portion of the blank therebetween, at least one of said members being grooved to interlock with a deformed selvedge of the blank, and said members being apertured transversely of the plane of the blank engaged thereby at a point inwardly of the groove for engaging the deformed selvedge, and a pair of cooperating feed rollers mounted in said apertures and positioned to engage the blank to advance it through the expander arm.

4. A mechanism for expanding a slitted blank having deformed selvages including a pair of stationary expander guides diverging from each other in a direction generally transverse the plane of the blank, the guides having grooves adapted to engage the deformed selvages of the blank to interlock therewith and thus prevent the blank from being drawn laterally out of the guides during expansion, a pair of additional guides having grooves also adapted to engage the deformed selvages of the blank, the additional guides being positioned beyond the divergent

guides with their grooves arranged substantially parallel to each other, and means for feeding the blank through said guides to effect expansion, said means including a pair of feed rollers associated with a divergent guide intermediate the ends thereof positioned to grip and advance the blank, and said means further including additional roller devices located beyond the delivery ends of the additional guides and having relatively extended area adapted to grip and engage the expanded blank.

5. A mechanism for expanding a slitted blank of predetermined length having deformed selvages, including a pair of stationary expander guides diverging from each other in a direction generally transverse the plane of the blank, the guides having grooves adapted to engage the deformed selvages of the blank to interlock therewith and thus prevent the blank from being

drawn laterally out of the guides during expansion, a pair of additional guides having grooves also adapted to engage the deformed selvages of the blank, the additional guides being positioned beyond the divergent guides with their grooves arranged substantially parallel to each other, and means for feeding a blank through the guides including at least three sets of roller devices serially arranged along the path of movement of the blank, one set being positioned in advance of the entrance ends of the divergent guides, another set being associated with a divergent guide intermediate the ends thereof, and a third being positioned beyond the delivery ends of said additional guides, the three sets of roller devices being spaced from each other a distance less than the predetermined length of the blank.

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