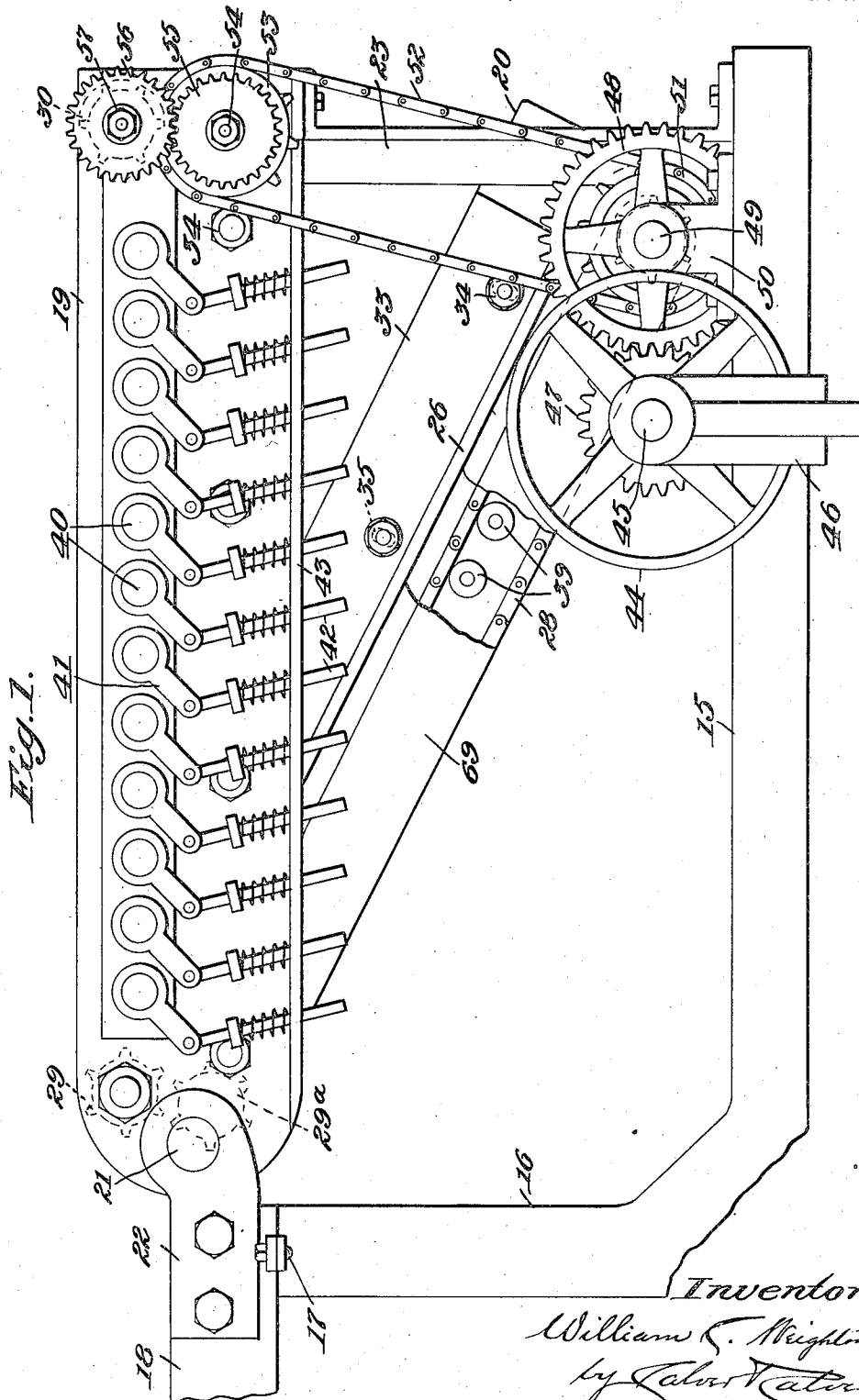


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EXPANDED METAL MACHINE.
APPLICATION FILED MAY 24, 1921.

1,436,554.

Patented Nov. 21, 1922.

2 SHEETS—SHEET 1.



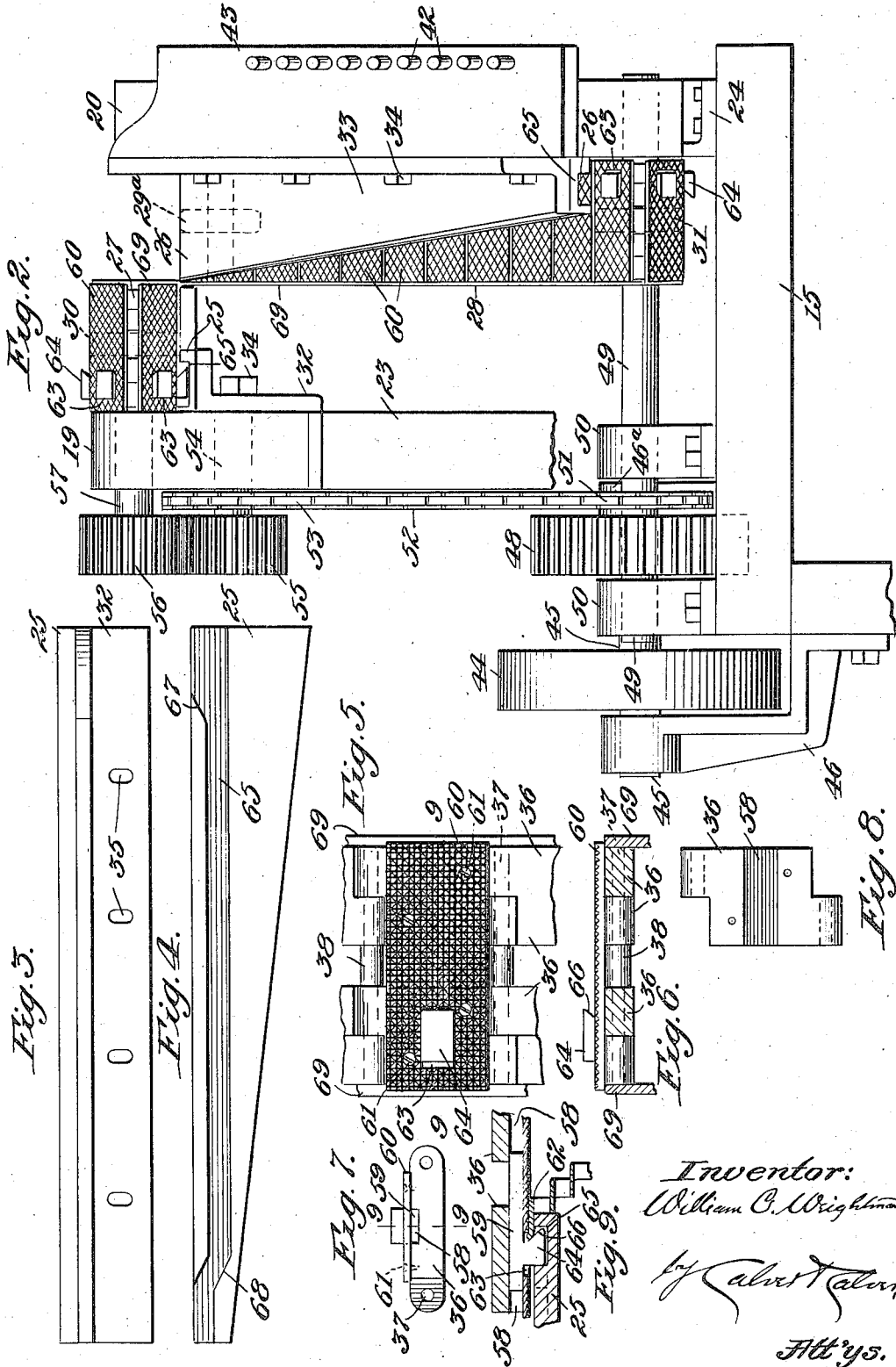
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2 SHEETS—SHEET 2.



Inventor:
William C. Weightman

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UNITED STATES PATENT OFFICE.

WILLIAM C. WEIGHTMAN, OF GREENSBURG, PENNSYLVANIA, ASSIGNOR TO WEIGHTMAN METAL MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

EXPANDED-METAL MACHINE.

Application filed May 24, 1921. Serial No. 472,078.

To all whom it may concern:

Be it known that I, WILLIAM C. WEIGHTMAN, a citizen of the United States, residing at Greensburg, in the county of Westmoreland and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Expanded-Metal Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to machines for making expanded metal in accordance with the well known method which consists in drawing out a slitted sheet in a direction transverse to the original plane of the sheet in order to open the slits therein. In the operation of many machines of this character, as now constructed and arranged, there is a tendency for the edges of the material to slip during its passage through the expanding mechanism, thereby producing an irregularly expanded sheet having somewhat sinuous edges which necessitate the overlapping of adjacent sheets when the latter are used for lathing and similar purposes. The present invention has for one of its objects the provision of expanding mechanism of such a character as to insure the production of an evenly expanded sheet having straight, parallel edges.

Another object of the invention is to provide expanding mechanism of the character referred to so constructed and arranged as to expand practically the full width of the sheet, as distinguished from many of the machines now in use whose operation is such as to leave an unexpanded marginal portion which must be subsequently trimmed off and wasted.

Further objects of the invention are to provide improved expanding mechanism of relatively simple and inexpensive construction, having parts which are comparatively few in number and which are so arranged as not readily to get out of order, and to provide mechanism which will operate in a smooth and easy manner with efficient utilization of power and minimum friction loss, thereby rendering the expense of operation and upkeep, as well as the initial cost, comparatively low.

The foregoing and other objects of the invention, together with means whereby the same may be carried into effect, will best be understood from the following descrip-

tion of one form or embodiment thereof illustrated in the accompanying drawings. It will be understood, however, that the particular construction described and shown has been chosen for illustrative purposes merely, and that the invention, as defined by the claims hereunto appended, may be otherwise practiced without departing from the spirit and scope thereof.

In said drawings:

Fig. 1 is a side elevation of the expanding mechanism.

Fig. 2 is an end elevation thereof, looking from the right in Fig. 1.

Fig. 3 is a side elevation of one of the combined guide and cam plates and the bracket for supporting the same.

Fig. 4 is a plan view of the cam plate shown in Fig. 3.

Fig. 5 is a fragmentary plan view of a portion of one of the feed chains, showing one of the gripping plates and the gripping dog co-operating therewith, the parts being shown in inoperative position.

Fig. 6 is an elevation of the parts shown in Fig. 5, looking from the bottom in the latter figure.

Fig. 7 is a side elevation of one of the chain links and the parts associated therewith.

Fig. 8 is a detail plan view of one of the chain links detached.

Fig. 9 is a detail sectional view, taken substantially on lines 9-9, Figs. 5 and 7, but showing the parts in inverted or operative position.

Referring to Figs. 1 and 2, 15 denotes the bed of the machine, said bed having at its rear end an upright portion 16 by which it is supported, and to which is bolted (as at 17) the forward end of the table 18 over which the slitted sheet metal is passed from the slitting mechanism. The latter mechanism forms no portion of the present invention, may be of well-known construction and arrangement, and is therefore not illustrated herein.

The expanding mechanism comprises laterally spaced, upper and lower expander arms 19 and 20 which are substantially parallel in plan, but which are arranged to diverge from one another as viewed in side elevation. The rear ends of said arms are supported at substantially the elevation of the table 18 by means of coaxially dis-

posed studs 21 carried by brackets 22 bolted to the forward end of said table. The arm 19 is supported at its forward end by an upright 23 rising from the bed 15, and is held thereby in a substantially horizontal position, or substantially in alinement with the top of the table 18, which determines the original plane of the sheet to be expanded. The arm 20 diverges forwardly and downwardly from the arm 19 and is provided at its outer end with a foot 24 which rests upon and is bolted to the bed 15.

The arms 19 and 20 are provided with expanding devices, those on each arm comprising a fixed plate for guiding the edge of the sheet in a direction substantially parallel to the length of the corresponding arm and a cooperating feed chain having one of its reaches disposed adjacent and parallel to said plate on the opposite side of the sheet therefrom, said chain being provided with gripping devices for engaging the adjacent edge of the sheet and moving the same longitudinally along the corresponding guide plate, and each guide plate being provided with means, preferably in the form of cam surfaces co-operating with said gripping devices, to cause the latter to grip and release said sheet at the beginning and completion of the expanding operation, respectively. The expanding devices carried by the respective arms are located on the inner or adjacent sides of the arms, the combined guide and cam plate 26 carried by the lower arm 20 being disposed at the upper side of the sheet, and the combined guide and cam plate 25 carried by the upper arm 19 being disposed at the lower side of the sheet, while the feed chains 27 and 28, carried by the arms 19 and 20 respectively, are disposed at the opposite sides of the sheet from the respective plates 25 and 26, as above explained. The inner ends of both plates 25 and 26 are disposed substantially in the plane of the upper surface of the table 18, and consequently in the original plane of the sheet, the plate 25 being arranged to guide and maintain one edge of the sheet in said plane, while the plate 26 is arranged to guide the opposite edge of said sheet in a direction diverging from said plane. The feed chain 27 is carried by sprockets 29 and 30 mounted on the rear and forward ends, respectively, of the arm 19, while the feed chain 28 is carried by sprockets 29^a and 31 similarly mounted on the rear and forward ends of the arm 20. The plates 25 and 26 are carried by brackets 32 and 33 secured by bolts 34 to the arms 19 and 20 respectively, the openings 35 in said brackets for the reception of said bolts being preferably slightly elongated in a direction transverse to the expander arms (see Figs. 1 and 3) in order to permit a slight adjustment of the plates 25 and 26

toward and from their respective feed chains to compensate for variations in thickness of the material being operated upon. The plates 25 and 26 may, if desired, be formed with inclined edges, as shown, to cause the expansion of the sheet to take place progressively from the median line thereof outwardly from its edges, or said plates may be of a constant width throughout their length and be provided with edges which are disposed in parallel vertical planes and spaced apart a distance substantially equal to or slightly less than the original width of the sheet, in order to cause said sheet to be expanded throughout its entire width at once. The reaches of the feed chains 27 and 28 which lie adjacent the guide plates 25 and 26 are supported and pressed toward said guide plates by pressure rollers 39 carried by eccentric studs 40 journaled in the arms 19 and 20, each of said studs having an arm 41 connected by a spring pressure device 42 with a flange 43 on the corresponding arm, whereby said rollers, and the reach of the chain engaged thereby, are yieldingly pressed toward the adjacent guide plate and yieldingly held against movement away therefrom.

Power from any suitable source is applied to the machine through a belt pulley 44 on a shaft 45 journaled in a bracket 46 bolted to the side of the bed 15 and in a second suitably disposed support 46^a rising from said bed. The shaft 45 is provided with a gear 47 which meshes with a gear 48 on a shaft 49 journaled at one end in the arm 20 and adjacent its opposite end in uprights 50 supported by the bed 15. The shaft 49 carries the sprocket 31 over which the feed chain 28 runs and by which it is driven. Said shaft 49 carries a second sprocket 51 which is connected by a chain 52 with a sprocket 53 on a shaft 54 journaled in the arm 19. The shaft 54 carries a gear 55 which meshes with a gear 56 on a shaft 57 which carries the sprocket 30 for supporting and driving the feed chain 27, whereby said chain is driven in unison with the chain 28. The sprockets 29 and 29^a are loosely mounted on suitably disposed studs carried by the arms 19 and 20 respectively.

Referring to Figs. 5 to 9 (which show portions of the chain 27), each of the chains 27 and 28 comprises two spaced, parallel series of links 36, the links of each series being arranged in pairs with the oppositely disposed links of the other series, and the links of each pair being connected with each other and with the contiguous links of their respective series by means of pins 37, which are preferably provided, between the links of the two series, with anti-friction rollers 38 for engagement with the teeth of the several sprockets 29, 29^a, 30, and 31 by which

said chains are carried and over which they run. The links 36 of each pair are provided in their outer faces with aligned, transverse grooves 58 which receive a dog 59 (see Figs. 7 and 9), said dog being guided in said grooves for movement transverse to the direction of travel of the feed chain. Each dog 59 is retained in the grooves 58 of the links 36 of the corresponding pair by a gripping plate 60 which bridges the space between the links and is secured to said links as by screws 61. The plates 60 are formed with roughened surfaces to engage the adjacent surface of the metal sheet 62 (Fig. 9), and are provided near their outer ends, and opposite the grooves 58 in the adjacent links 36, with openings 63 through which extend lugs 64 formed on the dogs 59. The lugs 64 co-operate with cam surfaces or grooves 65 (Fig. 4) on the plates 25 and 26 and are formed at their inner sides with inclined undercut faces 66 adapted, when the dogs 59 are moved inwardly, to clamp or pinch the edge of the sheet 62 against the plates 60, and particularly against the inner ends of the openings 63 therein. The cam grooves 65 are formed adjacent their rear ends with inclines 67 adapted, as each dog passes the sprocket 29 or 29^a and starts to move forwardly to advance the sheet, to force the lug 64 inwardly into gripping engagement with the edge of the sheet. Said cam grooves are also formed with inclines 68 adapted, as each dog approaches the sprocket 30 or 31, to force the lugs 63 outwardly out of engagement with said sheet to release the same.

The feed chains 27 and 28 are preferably enclosed at their inner sides by cover plates 69 which are supported at their ends by the shafts of the sprockets 29, 29^a, 30 and 31, and the gripping plates 60 are preferably made of slightly greater width than the chain so as to overlap and be guided upon the edges of said cover plates.

In operation the slitted sheet is fed forwardly by any usual or suitable means (not shown) from the table 18, and its opposite edges pass between the plates 25, 26 and their respective co-operating feed chains 27, 28. The edges of said sheet are thereupon gripped between the plates 60 and lugs 64 of the dogs 59, which are successively moved into gripping engagement by the inclines 67 of the cam or guide plates 25 and 26. Said edges of the sheet are further clamped between said cam or guide plates and the gripping plates 60 by the action of the pressure rollers 39, which tend to press said gripping plates toward said cam or guide plates. The opposite edges of the sheets are therefore carried longitudinally of the expander arms 19 and 20 by the feed chains, and the path or plane of travel of each edge is determined by the guide or cam plate 25 or 26 with which

it is held in engagement. As these guide plates are disposed longitudinally of the arms 19 and 20, which diverge from one another, the opposite edges of the sheet are gradually drawn apart to expand the sheet in the manner indicated in Fig. 9. When the sheet has been fully expanded, and as the gripping dogs successively approach the forward sprockets 30 and 31, the inclines 68 on the plates 25 and 26 operate to retract said dogs and release the sheet.

It will be observed that, by reason of the horizontal arrangement of the arm 19, one edge of the sheet is held by the plate 25 in its original plane throughout the expanding portion, the expansion being accomplished by deflecting the opposite edge, whose path of travel is determined by the plate 26, out of said plane. This, it is found, results in an extremely smooth and easy operation of the mechanism, and also permits the parts to be arranged with greater compactness than in machines of this general character as usually constructed.

It will also be noted that the expansion of the metal is accomplished by the use of two moving feed elements or chains only, one carried by each expander arm, said elements or chains acting solely to grip and advance the sheet, and the paths or planes of travel of the edges of the sheet being determined by the fixed plates 25 and 26.

It will further be observed that the edges of the sheets are firmly and positively gripped by parts guided for rectilinear movement in parallel vertical planes, or parallel planes transverse to the original plane of the sheet, so that there is no possibility of slippage of the material during its passage through the machine, thereby ensuring the production of an evenly expanded sheet having straight parallel edges. In this connection it will also be noted that the mechanism for advancing each edge of the sheet involves no parts which move over one another at an angle, and which, in certain types of machines of this character as heretofore arranged, not only tend to distort the sheet but also introduce an element of friction which decreases the efficiency of the machine from the standpoint of power consumption.

It will furthermore be noted that the mechanism for gripping and advancing the sheet is of such character as to engage the latter at substantially its extreme edge, so as to permit the expansion of the sheet throughout its full width, and without leaving an unexpanded marginal portion.

Having thus described my invention, I claim and desire to secure by Letters Patent:

1. A machine for expanding slitted sheet material comprising, in combination, mechanism for feeding one edge of a previously slitted sheet and for holding and guiding the same in the original plane of the sheet,

and mechanism for feeding the opposite edge of said sheet and for deflecting said opposite edge out of said original plane to expand the portion of said sheet between said edges.

5 2. A machine for expanding slitted sheet material comprising, in combination, horizontal and inclined expander arms, and mechanism carried by each of said arms for feeding and guiding one of the edges of the
10 sheet longitudinally thereof.

3. A machine for expanding slitted sheet material comprising, in combination, feeding means travelling with the sheet for advancing the opposite edges thereof, and fixed
15 means located at the edges of the sheet, for guiding said edges in diverging planes to expand said sheet.

4. A machine for expanding slitted sheet material comprising, in combination, fixed
20 means located at the edges of the sheet, for guiding the opposite edges of the sheet in diverging planes, and feeding means travelling with the sheet for advancing said edges and for holding the same in engagement with
25 said guiding means.

5. A machine for expanding slitted sheet material comprising, in combination, a pair of diverging expander arms, a fixed guide plate carried by each of said arms and disposed longitudinally thereof, each of said
30 guide plates engaging one side of the sheet adjacent one of the edges thereof, a feed chain carried by each of said arms parallel to the corresponding guide plate and engaging said sheet at the side opposite said guide
35 plate, pressure rollers for pressing said chains toward said guide plates, and gripping devices carried by said chains for gripping and advancing the edges of said sheet.

6. A machine for expanding slitted sheet material comprising, in combination, a single feed member travelling with the sheet for advancing each of the edges thereof, and fixed guides located at the edges of the sheet,
40 for causing the opposite edges of said sheet to travel in diverging planes.

7. A machine for expanding slitted sheet material comprising, in combination, a pair of diverging expander arms at least one of
50 which is disposed at an inclination to the original plane of the sheet, a single feed chain carried by each of said arms and disposed longitudinally thereof, and gripping devices carried by said chains for engaging
55 the edges of said sheet.

8. A machine for expanding slitted sheet material comprising, in combination, means for positively gripping and feeding the edges of the sheet, and means for guiding
60 said gripping and feeding means for movement in parallel planes transverse to the original plane of said sheet.

9. A machine for expanding slitted sheet material comprising, in combination, a pair
65 of sheet feeding members movable in

diverging paths, and means carried by said members respectively for positively gripping the extreme edges of the sheets.

10. A machine for expanding slitted sheet material comprising, in combination, a pair
70 of sheet feeding members movable substantially in parallel planes transverse to the original plane of the sheet, and means carried by said members respectively for positively gripping the extreme edges of the
75 sheet.

11. In a machine for expanding slitted sheet material, in combination, a feed chain, gripping plates carried by said chain, gripping dogs carried by said chain and co-op-
80 erating with said plates, and means for operating said dogs to grip and release the sheet before and after the expanding operation, respectively.

12. In a machine for expanding slitted
85 sheet material, in combination, a feed chain, gripping plates carried by said chain and provided with openings, gripping dogs carried by said chain and having undercut lugs extending through said openings, and a fixed
90 cam plate for operating said dogs to grip and release the sheet before and after the expanding operation, respectively.

13. In a machine for expanding slitted sheet material, in combination, a feed chain
95 comprising two parallel series of links arranged in pairs, the links of each pair being provided with aligned grooves, a gripping plate carried by each pair of links, and a gripping dog guided in the grooves of each
100 pair of links and co-operating with the corresponding gripping plate to grip and release the edge of the sheet.

14. In a machine for expanding slitted sheet material, in combination, a feed chain,
105 a cover plate for said feed chain, gripping plates carried by said feed chain and guided upon the edge of said cover plate, and gripping dogs carried by said chain and co-operating with said gripping plates.
110

15. A machine for expanding slitted sheet material comprising, in combination, means for gripping and feeding the opposite edges of the sheet, and means located at the edges
115 of the sheet, for guiding said edges and for operating said gripping means.

16. A machine for expanding slitted sheet material comprising, in combination, feeding means travelling with the sheet for advancing the opposite edges thereof, means
120 carried by said feeding means for gripping said edges, and fixed guides for said edges to cause them to travel in diverging planes to expand the sheet, said guides having means for operating said gripping means
125 to grip and release the sheet before and after the expanding operations, respectively.

17. A machine for expanding slitted sheet material comprising, in combination, a pair of diverging feed chains, gripping plates car-
130

ried by said chains, gripping dogs carried by said chains and co-operating with said plates to grip the edges of the sheet, and guide plates for causing the opposite edges of the sheet to travel in diverging planes to expand the said sheet, said guide plates having cam surfaces for operating said dogs to grip and release the sheet before and after the expanding operation.

10 18. In a machine for expanding slitted sheet material, in combination, a feed chain comprising two parallel series of links arranged in pairs and pins connecting the links of each pair with each other and with the contiguous links of their respective series, 15 sprockets by which said chain is carried, said sprockets co-operating with said pins between the links of each pair, and a gripping plate carried by each pair of links and bridging the space between them. 20

In testimony whereof I affix my signature.
WILLIAM C. WEIGHTMAN.