L. E. CURTIS.

MACHINE FOR EXPANDING SHEET METAL.

APPLICATION FILED FEB. 18, 1911.

1,011,588.

Patented Dec. 12, 1911.

6 SHEETS—SHEET 1.

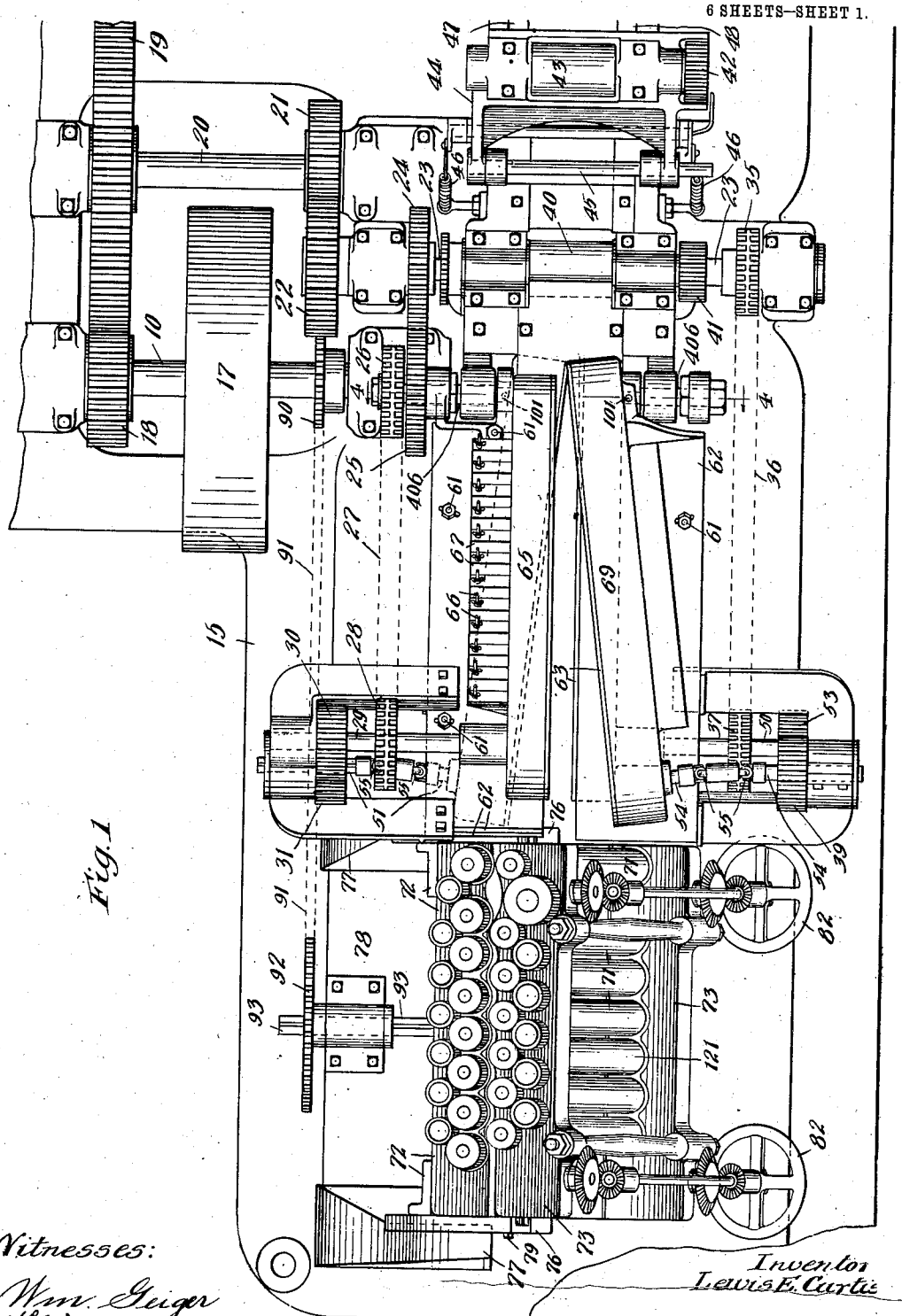


Fig. 1

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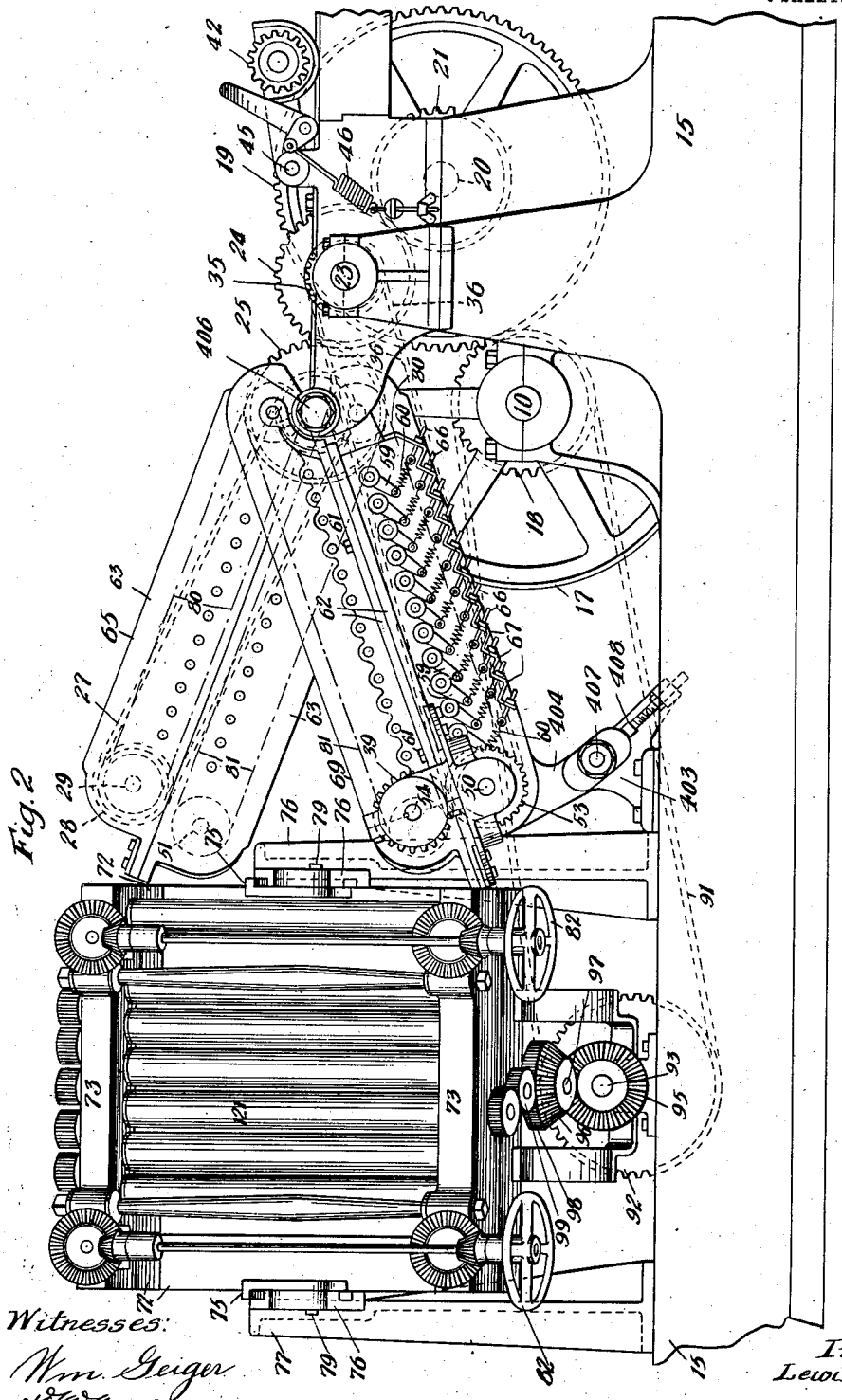


Fig. 2

Witnesses:

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6 SHEETS—SHEET 3.

Fig. 3

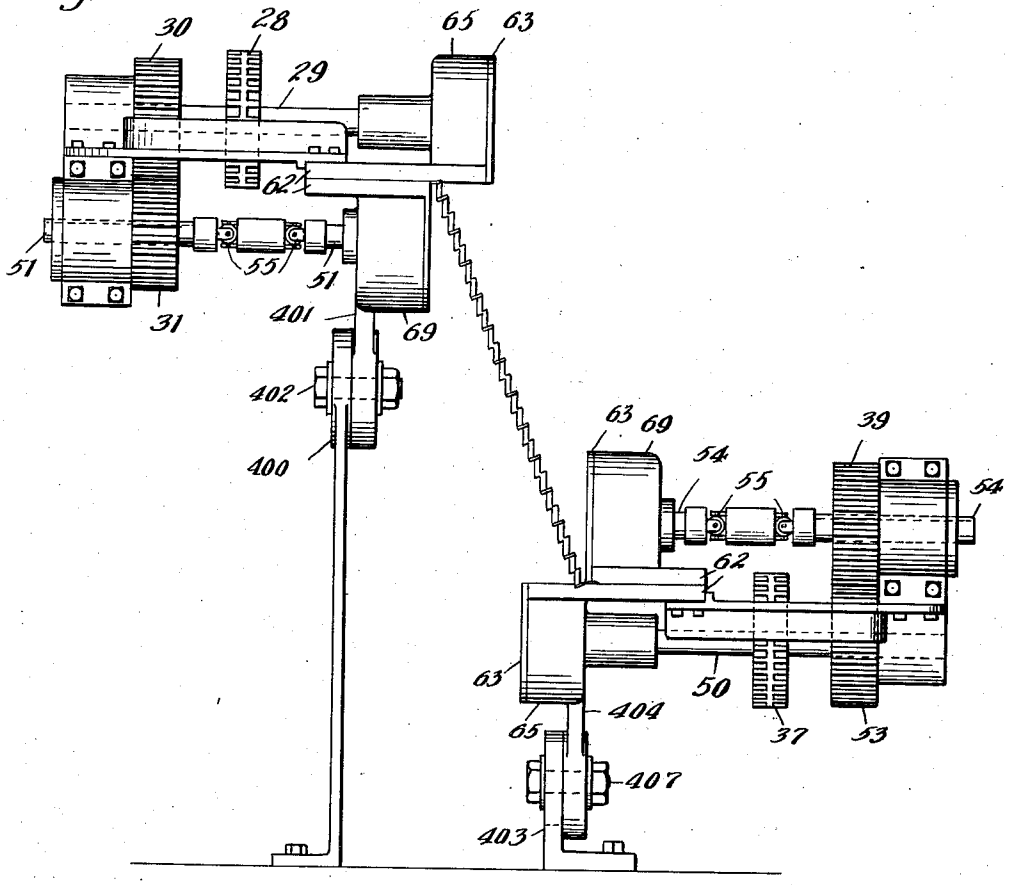
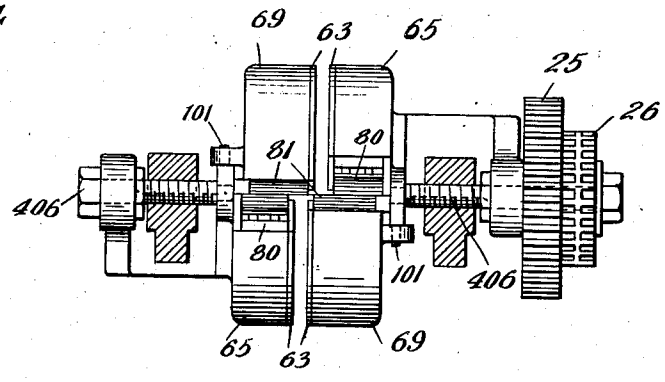


Fig. 4



Witnesses:

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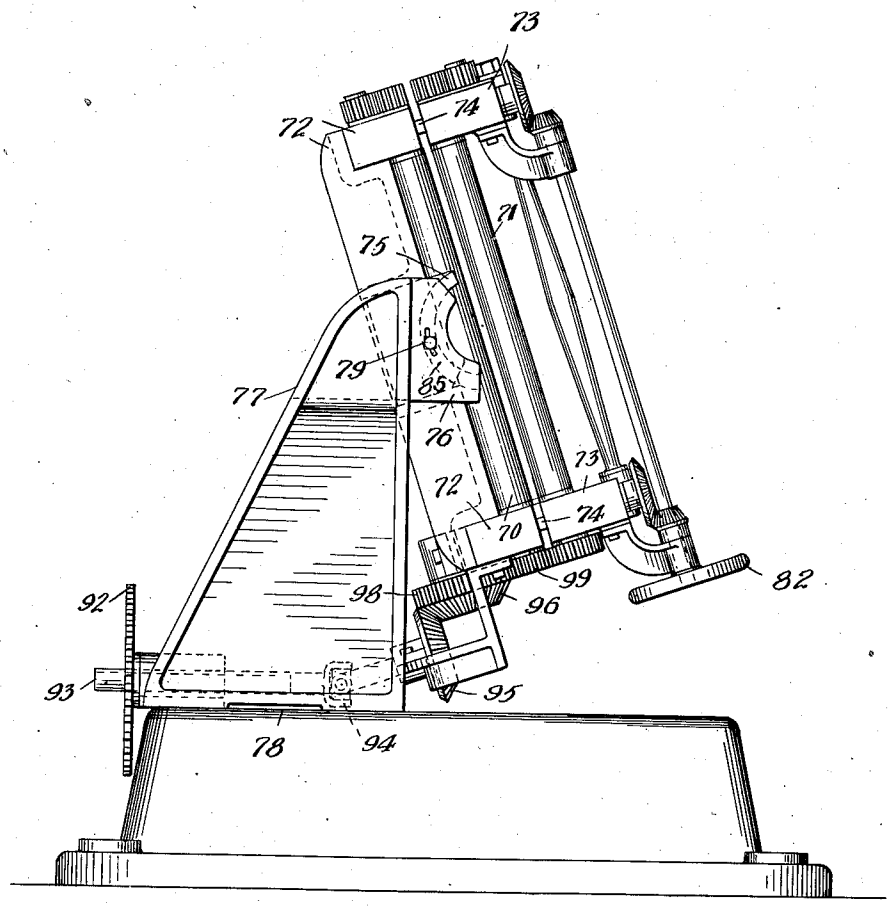
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6 SHEETS—SHEET 4.

Fig. 5



Witnesses:

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6 SHEETS—SHEET 5.

Fig. 6

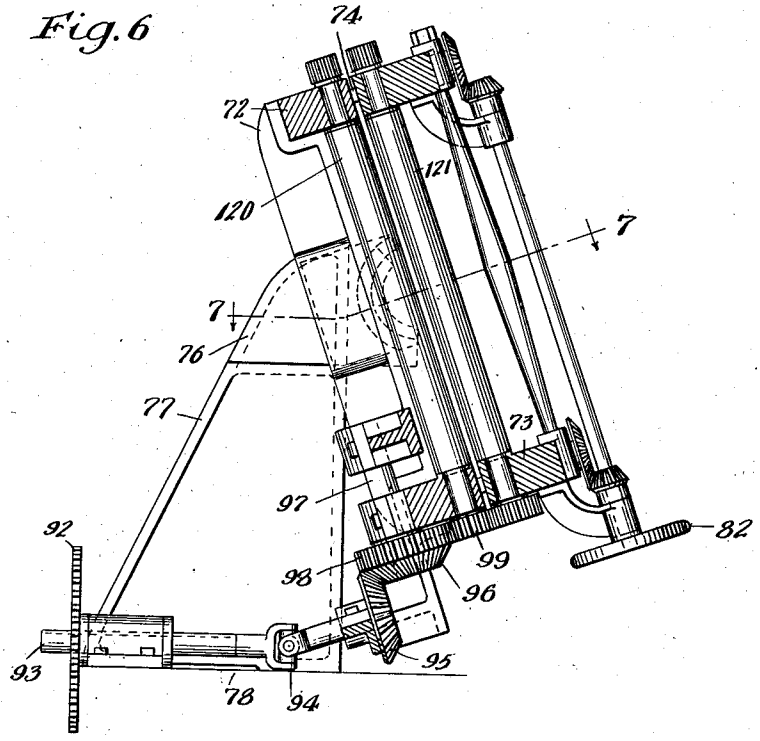
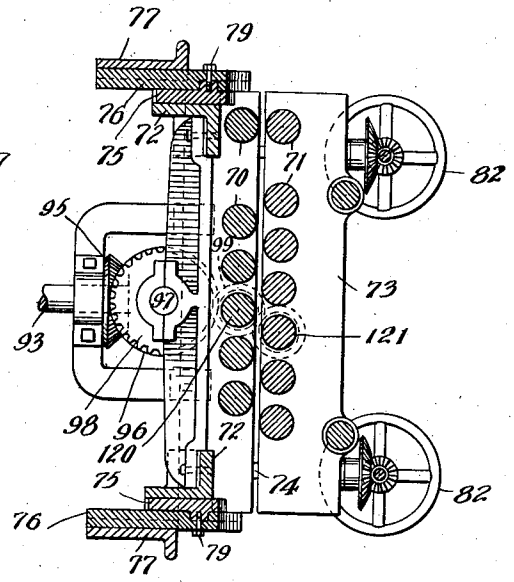


Fig. 7



Witnesses:

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6 SHEETS—SHEET 6.

Fig. 8

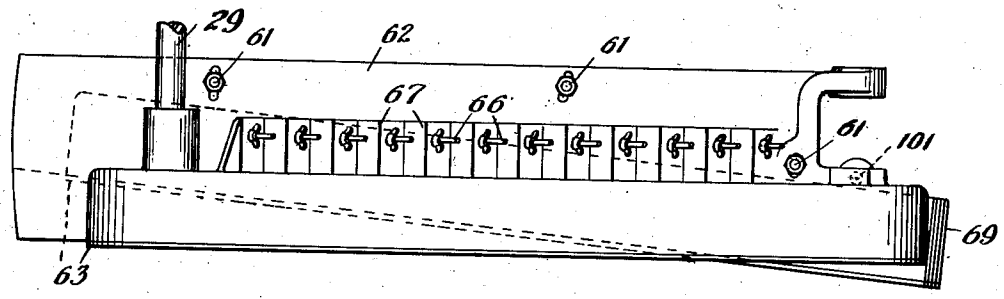
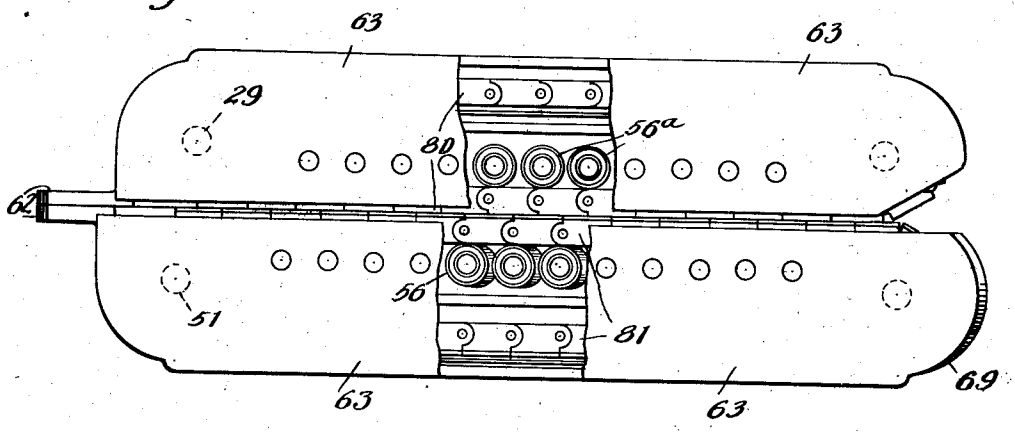


Fig. 9



Witnesses:

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UNITED STATES PATENT OFFICE.

LEWIS E. CURTIS, OF KENILWORTH, ILLINOIS, ASSIGNOR TO AMES STEEL LATH COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

MACHINE FOR EXPANDING SHEET METAL.

1,011,588. Specification of Letters Patent. Patented Dec. 12, 1911.

Application filed February 18, 1911. Serial No. 609,486.

To all whom it may concern:

Be it known that I, LEWIS E. CURTIS, a citizen of the United States, residing in Kenilworth, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Expanding Sheet Metal, of which the following is a specification.

This invention relates to machines for expanding sheet metal which has been previously cut or slitted.

It embodies substantially the invention set forth in Letters Patent No. 917715 granted to me April 6, 1909 and is an improvement thereon. Its object has been to obtain a construction having a wide range of adjustment of the expanding devices so that the machine is adapted to be used in expanding sheets which are cut with slits of different lengths and with intervening strands between the slits of different widths.

The invention consists in the novel construction of parts and devices, and in the novel combinations of parts and devices hereinafter set forth.

In the accompanying drawing forming a part of this specification, Figure 1 is a plan of the machine. Fig. 2 is a side elevation. Fig. 3 is an end elevation of the expanding mechanism. Fig. 4 is a transverse section on the line 4—4 of Fig. 1. Fig. 5 is a rear elevation of the sheet leveling mechanism. Fig. 6 is a vertical section of the leveling mechanism. Fig. 7 is a section on the line 7—7 of Fig. 6. Fig. 8 is a plan of one of the expander arms detached and Fig. 9 is a side elevation of the same partly in section.

In the drawings 15 represents the frame of the machine and 10 is the driving shaft actuated by pulley 17.

At 65 and 69 are shown the two diverging expanding arms supported at their receiving ends upon the horizontal rod 406, and at their discharging ends they are supported one upon the uprights 400 and 401 spliced together by a bolt 402, and the other arm upon vertical supports 403 and 404 united together by bolt 407. Under the support 404 is an adjusting bolt 408 whereby the downwardly expanded arm may be adjusted vertically. The upper arm is adjusted vertically by loosening the bolt 402 and retightening it after the adjustment has been effected.

The shaft 10 carries a gear 18 meshing with a gear 19 on shaft 20, and through the gears 21 and 22 gives motion to shaft 23 extending across the machine. This shaft carries a gear 24 meshing with a gear 25 on the shaft of a sprocket 26 and through such wheel and the chain 27 actuates a second sprocket wheel 28 on shaft 29. Shaft 23 also carries a sprocket wheel 35 and through said wheel and the chain 36 actuates a sprocket 37 on shaft 50. Shaft 29 carries a gear 30 which meshes with a gear 31 on a flexible shaft 51, and shaft 50 carries a gear 53 meshing with a gear 39 on a flexible shaft 54. The shafts 29, 50, 51 and 54 each carry wheels adapted to receive and actuate the feed chains by which the sheets are fed through the expander. These chains and their carrying wheels are located in the expander arms hereinafter described.

The expander arms diverge from each other both vertically and horizontally, and they each consist of two metal frames or castings 65 and 69, and they form housings for the chains 80 and 81 bearing upon opposite sides of the sheets and both the carrying and the rotating wheels of said chains. The castings of each arm are bolted together by bolts 61 passing through flanges 62 and the chains are confined in the castings by vertical side plates 63. The arms and the expanding mechanisms embodied in them are substantially alike in construction differing mainly in the fact that one is the reverse of the other and acts to force its side of the slitted sheet upward while the other acts to force its side downward. The chains are necessarily flexible and in order that they may exert the necessary pressure on the work, I place back of that course of each chain which is in contact with the work, devices acting to cause this pressure. These devices in the case of each chain 81 preferably consist of rollers 56 which are supported on eccentric pivots having bearings in the side plates and in the castings 65 and 69, and also having arms 59 to which springs 60 are attached. The springs are also attached to adjustable bolts 66 passing through openings formed in the zigzag por-

tion 67 of the castings, and their tension tends to cause pressure by the rollers on the work, this being substantially the construction shown in my said patent. In the case of each chain 80, I use plain rollers 56ª which are adapted to support those chains against the pressure transmitted through the stock from the pressure devices acting on chains 81.

It is desirable that these expanding machines be adapted to expand sheets differing from each other in the length of the slits cut in them and also differing in the width of the spaces or strands between the rows of slits, and to adjust them, for these differently cut sheets, I have devised the following: The frame casting 65 of each expander arm is provided with a vertical pivot 101 at its receiving end so that the discharging end of such castings after they are unbolted from the parts 69, may be swung on such pivots to carry them toward or away from the other expander arm and thus increase or decrease the divergence between the two arms as required by the work being done. By thus varying the divergence, the machine is able to expand sheets having the different cuts. After the parts 65 have been adjusted to suit the work, they are rebolted rigidly to the parts 69, and the machine is then ready for operation. In this adjusting operation, the angle between the driving wheels of the chains 80 located in the parts 65 and their actuating shafts 51 and 54 will necessarily be changed, and to prevent trouble from this cause, I make such shafts with two or more universal joints 55 and also give said shafts freedom to slide in their respective actuating gears so that the shafts and chains accommodate themselves at once to their changed relative positions after each adjustment and work as perfectly together as before the adjustment was made. It will be noted that the bolts 61 uniting the castings 65 and 69 pass through elongated slots in one of the castings so as to permit the adjustment described.

After the sheet is expanded, I pass it between two opposing series of straightening or leveling rolls 70, 71, in frames 72 and 73 adjustably united together by screws 74 located preferably at the corners of the frames. The frames are supported by arcs 75 attached to the sides of frame 72 and entered in curved ways 85 formed in plates 76 attached to uprights 77 resting on the base 78. The rolls are arranged at an angle to the vertical as shown, the same being the angle of the sheet at the time it is discharged by the expander, but this inclination can be changed whenever necessary by simply loosening the bolts 79 which are threaded in the arcs and pass through the curved ways 85. When the adjustment has been made, the bolts 79 are tightened so that the frames are rendered rigid as to position. The frames are adjusted at different distances apart by rotating the screws 74 which may be done by means of the hand wheel 82, the shafts of the wheels being geared each to two of the screws. The leveling rolls are arranged close to the expander, and take hold of the sheets usually before they have been entirely released by the expander. The rolls are actuated so that they continue the movement of the sheet received from the expander without change in speed or direction, and this action is received from shaft 10 through the sprocket 90 and chain 91 by sprocket 92 on shaft 93 having a universal joint 94 and carrying a bevel gear 95 meshing with another bevel gear 96 on a shaft 97 in frame 72. Shaft 97 carries a gear 98 meshing with a gear 99 on the roll 120 of frame 72 and all the rolls of both frames are provided with individual gears taking motion from the roll 120 and the roll 121 of frame 73 geared with 120 so that all are driven in unison. By means of the leveling rolls the sheets are straightened and deprived of bends and kinks. Changes in the inclination of the leveling rolls do not affect the driving of the rolls because of the universal joint 94 in shaft 93.

Upon the shaft 23 is mounted a feed roll 40, and a gear 41 meshing with the pinion 42 on the journal of a second feed roll 43. These feed rolls coact in forcing the slitted sheets into the expander and the upper of them is supported in a pivoted frame 44 the pivot being shown at 45, in such manner that the frame can be thrown over from its operating position to that shown in full lines in Fig. 2. This enables access to be had to the passing sheet. When in acting position the upper roll is held to its work by springs 46. The feed rolls 40 and 43 deliver the slitted sheets between the stationary guides 47 and 48 which conduct it to the expanding mechanism.

I claim:—

1. The machine for expanding slitted sheet metal, having diverging expander arms and means for feeding the sheet between said arms being each made in two parts and the corresponding parts of both being pivoted at the receiving ends so that the discharging ends may be adjusted to increase or decrease the horizontal divergence between them.

2. The machine for expanding slitted sheet metal, having diverging expander arms, and means for feeding the sheet between said arms, said arms being made each in two parts with one of the feeding chains in each part, and one part of each arm being pivoted at the receiving ends so that the discharging ends of the arms are rendered adjustable horizontally to vary the distance between such ends.

3. The machine for expanding slitted sheet metal having diverging expander arms and means for feeding the sheets between the arms, each arm being made in upper and lower parts and each part containing the feeding device acting on one side of the sheet and one of the parts of each arm being pivoted at the receiving end so that the discharging ends of the same parts may diverge varyingly from each other.

4. The machine for expanding slitted sheet metal having diverging expander arms and means for gripping the flat surfaces at the margin of the sheet and feeding it between the arms, said arms being each made in two parts and each part embodying a portion of the feeding means, and one of said parts of each arm being pivoted at the receiving end so that they may be horizontally adjustable at the discharging end.

5. The machine for expanding slitted sheet metal, having diverging expander arms, and means for feeding the sheet between said arms, the feeding device of one arm acting on the top of the sheet, and the feeding device of the other arm acting on the under surface of the sheet, being both adjustable at their discharging ends in a horizontal direction to and from each other.

6. The machine for expanding slitted sheet metal, having diverging expander arms and feeding chains for carrying the sheet between the arms, there being chains on both sides of the sheet in each arm, two of such chains one in each arm and on opposite sides of the sheet being both adjustable horizontally toward or from each other at their discharging ends.

7. In a machine for expanding sheet metal, the combination with diverging arms and chains for feeding the sheet between the arms, the chains being horizontally adjustable, of shafts for actuating the wheels of such chains having universal joints accommodating the changes in position of the wheels in the adjustments.

8. In a machine for expanding sheet metal, the combination with diverging arms and chains for feeding the sheet between the arms, the chains being horizontally adjustable, of shafts for actuating the wheels of such chains having universal joints accommodating the changes in position of the wheels in the adjustments and also having freedom to slide in the wheels.

9. The combination with a machine for expanding sheet metal, embodying expander arms which are adjustable toward and from each other in horizontal directions at their discharging ends to accommodate sheets cut with different lengths of slits, of mechanism for leveling or straightening the sheets, such mechanism being adapted to take hold of the advance end of the sheet before the sheet has been wholly expanded and both said machine and said mechanism being adjustable as to inclination.

10. The combination with a machine for expanding sheet metal, of mechanism for leveling or straightening the sheets, consisting of two opposing series of rolls arranged at an angle to the vertical and mounted in supports adjustable as to such angle and adjustable driving mechanism for actuating the same.

11. The combination with a machine for expanding sheet metal, of mechanism for leveling or straightening the sheets, consisting of two opposing series of rolls arranged at an angle to the vertical and mounted in supports adjustable as to such angle, and means for driving said rolls connected to a source of power by a shaft having a universal joint.

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Witnesses:
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EDW. S. EVARTS.