April 10, 1928. 1,665,349

H. M. GERSMAN ET AL

SLITTING ROLL OF MACHINES FOR FORMING EXPANDED METAL

Filed March 19, 1926 2 Sheets-Sheet 1

Fig. 2.

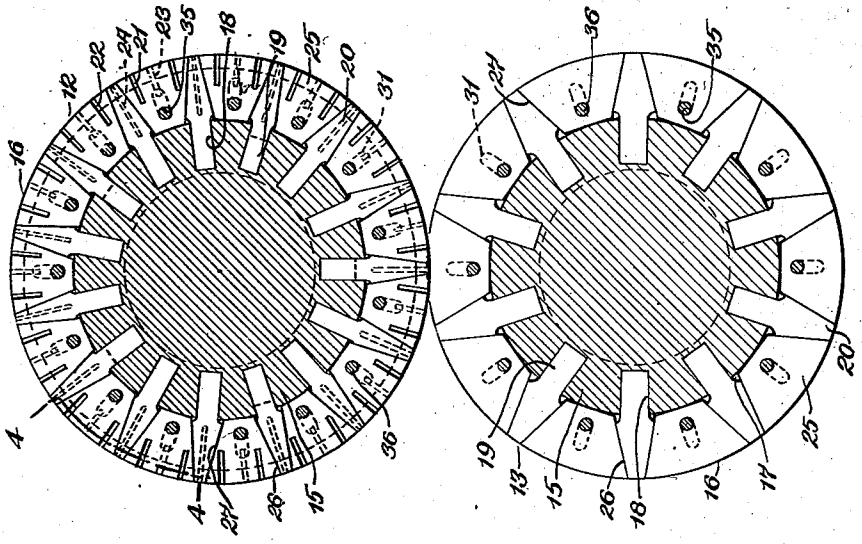
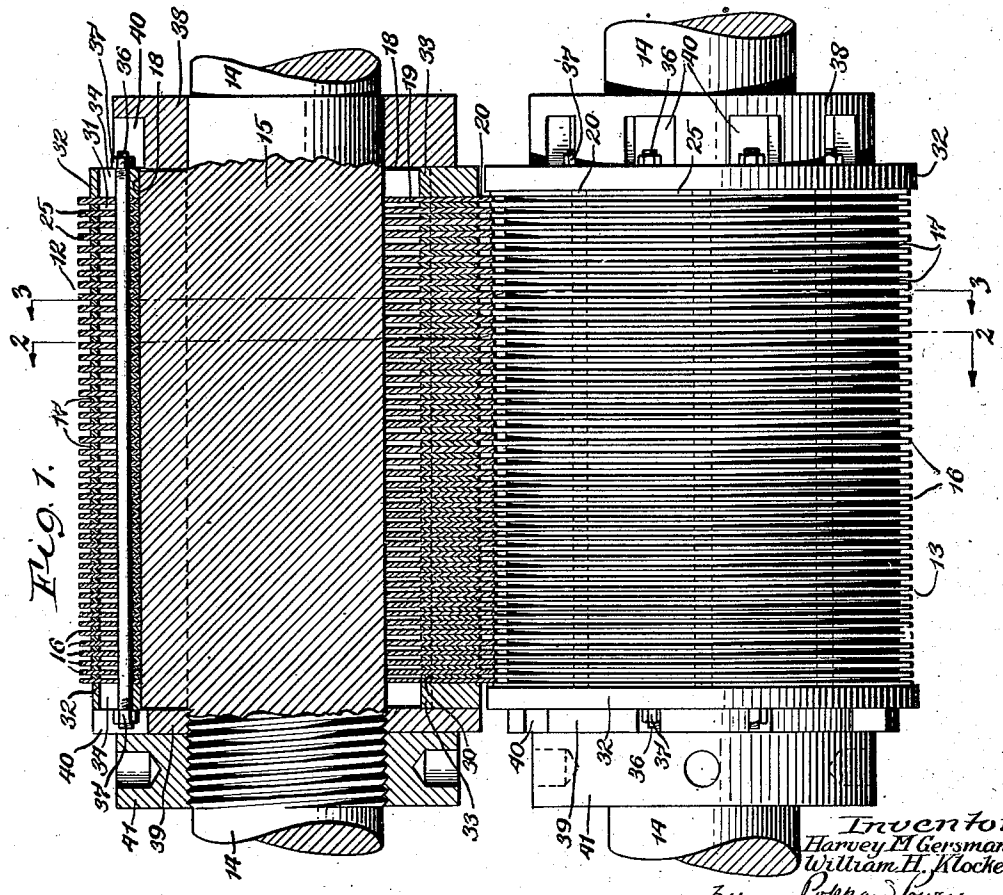


Fig. 1.



Inventor
Harvey M Gersman
William H. Klocke
by Popp and Towers
Attorneys

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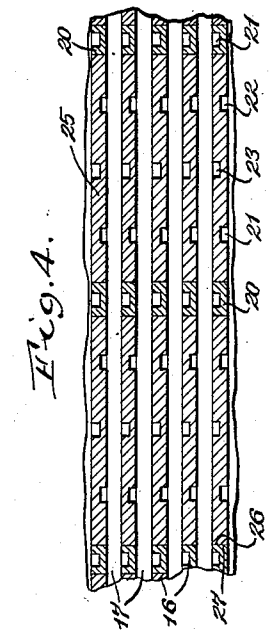


Fig. 4.

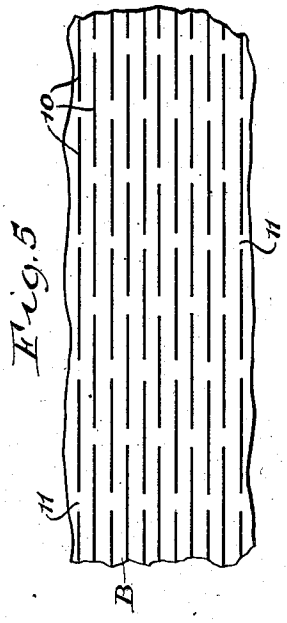


Fig. 5.

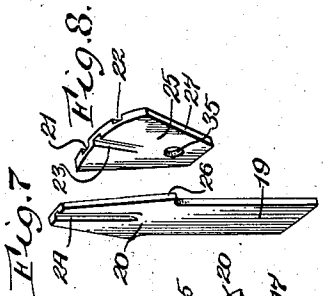


Fig. 7.

Fig. 8.

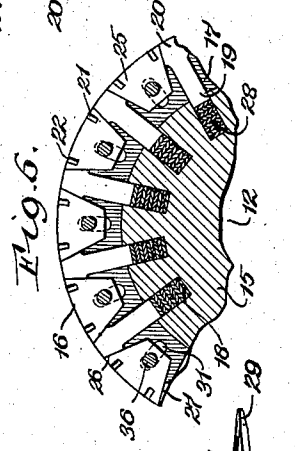


Fig. 6.



Fig. 9.

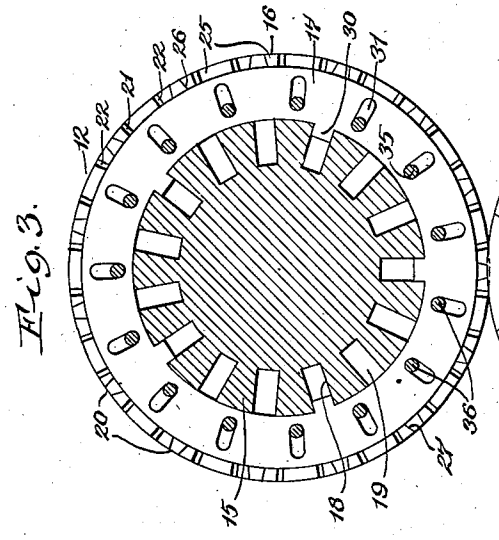
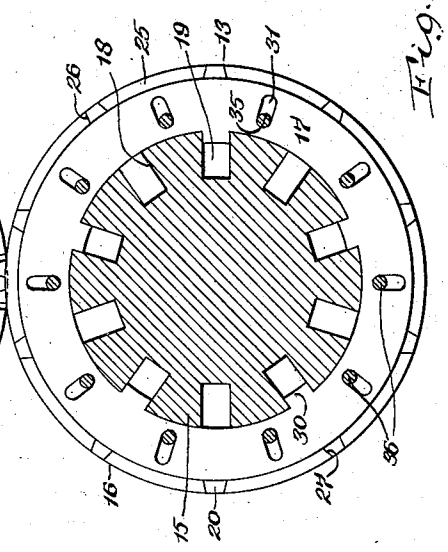


Fig. 3.



Inventor
Harvey M. Gersman
William H. Klocke
by Popp and Powers.
Attorneys

Patented Apr. 10, 1928. 1,665,349

UNITED STATES PATENT OFFICE.

HARVEY M. GERSMAN, OF BUFFALO, AND WILLIAM H. KLOCKE, OF NEW YORK, N. Y., ASSIGNORS TO KALMAN STEEL COMPANY, INC., OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

SLITTING ROLL OF MACHINES FOR FORMING EXPANDED METAL.

Application filed March 19, 1926. Serial No. 96,024.

This invention relates to improvements in the slitting rolls of machines for forming expanded metal and proposes a roll of special utility in connection with the production of expanded metal of the kind disclosed in the patent to Harvey M. Gersman No. 1,562,157, dated Nov. 17, 1925, but which may also be used to advantage in the production of expanded metal of other forms wherein the blank is provided with parallel rows of slits in break joint or staggered relation.

The principal object of the invention is to provide a slitting roll by which slits of constant determined length and pitch may at all times be produced. A further object is to provide a slitting roll whose diameter may be maintained substantially constant notwithstanding repeated resharpening.

With the above objects in view, the invention consists in a slitting roll having spaced cutting rings, each composed of radially adjustable elements of such form and relation as to provide for a continuous ring circumference in any position to which they may be adjusted and also to provide for any diameter of the ring which may be determined upon; also in a slitting roll having cutting rings, each composed of grooved radially adjustable cutting elements of such form and arrangement as to insure the constancy of the length and pitch of the slits; and also in various details of structure and assembly which promote facility in the adjustment of the cutting elements and security in the maintenance of their adjustment.

An embodiment of the invention is illustrated in the accompanying drawings wherein:

Fig. 1 shows a pair of cooperating slitting rolls, the upper roll being shown in longitudinal section and the lower roll in side elevation.

Figs. 2 and 3 are cross-sections of the slitting rolls taken on the lines 2—2 and 3—3 of Fig. 1.

Fig. 4 is a fragmentary developed sectional view of a number of adjacent cutting rings of the upper roll, the same being taken on the line 4—4 of Fig. 2.

Fig. 5 is a fragmentary plan view of the slitted blank.

Fig. 6 is a fragmentary cross-section of the upper slitting roll showing the elements of one of the cutting rings after successive adjustments thereof.

Figs. 7 and 8 are perspective views of the two forms of cutting elements of which each ring of the upper roll is composed.

Fig. 9 is a perspective view of one of the shims which determine the position of the cutting elements.

The blank B is shown in Fig. 5 as provided with longitudinal slits 10 which aline in the direction of their length and are arranged in parallel rows, the slits of one row being in staggered or break-joint relation to the slits of adjacent rows. The bonds of the expanded metal are subsequently provided by the material indicated at 11 which lies between the ends of the adjacent alining slits and between the corresponding slits of the alternate rows. Such a blank is available for diamond mesh lath of ordinary form as well as for special forms of lath including that shown in said Gersman patent according to which the slitted blank is subsequently formed with transverse corrugations, the apices of which are provided by the bonds 11, and is thereafter expanded to form the finished product.

As heretofore constructed, the upper slitting roll of metal expanding machines is formed with continuous integral annular cutters provided with radial grooves which determine the location of the bonds 11 in the blank, the cutting edges intermediate the grooves cooperating with the plain annular cutters of the lower roll to form the slits. As these cutters become worn and are resharpened, their peripheries are necessarily reduced and with the reduction of the peripheries of the cutters of the upper roll there is a decrease in the peripheral spacing of the grooves. This results also in a decrease in the length of the cutting edges between the grooves and corresponding alterations in the length and pitch of the slits, the word "pitch" being used to designate the distance between the centers of the slits of each row. With all kinds of lath this variation in the length and pitch of the slits is disadvantageous and it is particularly disadvantageous in the production of lath of the kind shown in said Gersman Patent No. 1,562,157, in which the symmetrical form of the corrugations relative to the bonds 11 necessitates a substantial measure of precision

in the slitting of the blank. The present slitting rolls overcome the above objections and enable the length and pitch of the slits to be maintained constant and as originally determined, regardless of the repeated sharpening of the cutter elements.

The slitting mechanism consists of an upper roll 12 and a lower roll 13 between which the blank is fed. Each of these rolls comprises a body portion 15, on which the cutting elements are mounted to constitute the cutting rings 16, and reduced spindles 14 projecting from the ends of the body portion and journaled in suitable supporting stands, it being understood that the spindles are driven by suitable gearing, the illustration of which is deemed unnecessary. The cutting rings 16 are separated from one another along their cutting edges, preferably by spacing rings 17; and the cutting rings of one roll operate in the clearances between those of the other roll, thereby to act with shearing effect. The body portion 15 of each roll is formed with longitudinal grooves 18 which are spaced equidistantly and extend the full length of said body portion. Each of these grooves has parallel sides and serves as a keyway to accommodate the shanks 19 of the cutters 20 as will be more fully described.

The upper roll determines the extent and location of the slits and the bonds, each cutting ring having for this purpose a plurality of spaced grooves 21, 22, 23 and 24 which extend inwardly from the periphery, the edges between the grooves cooperating with the edges of the cutting rings of the lower roll to cut the slits in the blank, and the grooves providing for regularly recurring interruptions of the cutting action with resultant bond-providing portions between the slits, the slitting operation thus conforming to the ordinary practice. The cutting rings are each adapted to participate in the cutting of two rows of slits and the grooves are arranged alternately on opposite sides of each cutting ring, as best shown in Fig. 4, thereby providing for the staggered or break-joint relation of the slits.

The cutting rings of the upper roll are each composed of two sets of cutting elements 20 and 25, those of one set being arranged alternately to those of the other. The cutting elements 20 are of wedge form and the elements 25 are of reciprocal wedge form. In both sets the working edges are curved along arcs of the determined circumference of the cutting ring. Thus each element 20 has sides 26 which extend convergently toward the working edge and each element 25 has sides 27 which extend divergently toward the working edge and conform in inclination to the sides 26 of the elements 20. As thus formed the cutting elements may be adjusted outwardly along radial lines and in all positions maintain the continuity of the cutting ring in which they are incorporated. The elements 20 are adjusted in the first instance and their movement is imparted to the elements 25 which are thus supported against inward displacement by the elements 20. Th form of the cutting elements as above described is such that in adjustment the elements 20 have substantially twice the movement of the elements 25 and therefore the grooves 21 in the elements 20 and the working portions through which the grooves extend are substantially twice the length of the grooves 22, 23 and 24 and the working portions of the elements 25. In order to facilitate the adjustment of the cutting elements and also to key the cutting rings to the body 15, the elements 20 are provided with inwardly extending shanks 19 which fit conformably in the grooves 18. The outward adjustment of the cutters 20 is preferably effected by means of shims 28 fitted in the grooves 18 under the shanks 19, one of these shims being shown in Fig. 9. Each shim is of the thickness to adjust the elements 20 the required distance and for each adjustment of a longitudinal row of elements 20 a single shim is used, the length of the elements 20 being such that several adjustments are possible. The shims extend the full length of the grooves 18 and each have a pointed end 29 to facilitate their insertion. The first shims are laid on the bottoms of the grooves and the succeeding shims are laid on the preceding shims, thereby permitting any desired outward adjustment of the cutting elements to be effected, as clearly shown in Fig. 6. In each adjustment the cutting elements are moved to positions wherein their working edges are located beyond the normal or determined circumference of the cutting ring, the projection beyond such circumference being greater as to the elements 20 than as to the elements 25. The cutting elements thus adjusted are thereupon sharpened until their cutting edges are in peripheral alinement in arcs which conform to the normal or determined circumference of the cutting ring.

The constancy of the pitch and length of the slits in connection with all adjustments of the cutting elements is provided for by suitable arrangement of the grooves in said elements. Thus the grooves 21 of each cutting element 20 and the intermediate groove 23 of each cutting element 25 extend radially and coincide in location with the radial axes along which the respective cutting elements are movable; and the outer grooves 22 and 24 of each cutting element 25 are parallel to the radial groove 23. As the cutting elements are moved radially outward in adjustment the pitch of the grooves 21 and 23 will remain constant in any concentric annular line, because along any such line the

peripheral extent of the cutting elements 25 will decrease and the peripheral extent of the cutting elements 20 will increase in compensating degree, the inclination of the sides of the cutting elements being selected to determine this result. The parallel relation of the grooves 22 and 24 to the radial groove 23 of the same element fixes the pitch of these three grooves to one another and since the constancy of the pitch of the grooves 21 and 23 is provided for in the manner described it follows that the grooves 22 and 24 will likewise have constant pitch relative to the grooves 21.

As there is a certain tolerance in respect to the pitch of the slits in the blank it is practical to have two or perhaps three sharpenings of the cutters between the adjustments thereof.

The spacing rings 17 are provided with a suitable number of tangs 30 which engage in corresponding grooves 18 of the roll body and carry the driving strain or at least share it with the cutting elements 20. Each spacing ring is formed with radial slots 31 which aline with the cutting elements 25. At the ends of the roll body end heads 32 are arranged, these being similar in form to the spacing rings but being of greater thickness. The end heads are formed with tangs 33 which fit in the grooves 18 of the roll body and also with radial slots 34 which aline with the radial slots of the spacers 17. Each cutting element 25 is provided with a centrally located hole 35 in alinement with corresponding slots 31 and 34 of the spacers and end heads. Tie rods 36 are passed through the alining holes and slots of the spacers, cutting elements and end heads and nuts 37 are provided at the ends of each tie rod for use in drawing the end heads against the end cutting rings, thereby to secure the cutting elements against radial displacement. Lengthwise displacement of the cutting rings and spacing rings is prevented by collars 38 and 39 fitted on the spindles 14 and bearing against the end heads. The collar 38 preferably has a shrunk fit on its supporting spindle and the collar 39 preferably has a threaded fit and is backed by a similarly fitted lock collar 41. The collars 38 and 39 are formed with recesses 40 which provide suitable clearances for the nuts 37. When it is desired to readjust the cutting elements the nuts 37 are backed off in order to loosen the tie rods and permit radial movement thereof, the collars 39 and 41 are removed in order to expose the adjacent ends of the grooves 18, the shims 28 are fitted in said grooves to effect the adjustment of the cutting elements in the manner described, and the nuts 37 are then tightened to secure the parts as before.

The lower roll is of the same construction as the upper roll except that its cutting elements are not formed with grooves so that the edges of the cutting rings are continuous. Owing to the absence of grooves in the cutting elements of the lower roll it is practical in each cutting ring to use a smaller number of cutting elements of greater peripheral extent.

We claim as our invention:

1. A slitting roll for use in metal expanding machines having cutting rings, each consisting of cutting elements mounted for outward adjustment with respect to the periphery of said roll and of such form as to maintain the continuity of the ring in any positions of outward adjustment.

2. A slitting roll for use in metal expanding machines having cutting rings, each consisting of cutting elements mounted for radial adjustment and of reciprocal wedge form.

3. A slitting roll for use in metal expanding machines comprising a roll body and cutting rings mounted thereon, each cutting ring consisting of cutting elements mounted for adjustment outward with respect to said body and of such form as to maintain the continuity of the ring in any positions of outward adjustment.

4. A slitting roll for use in metal expanding machines comprising a roll body and cutting rings mounted thereon, each cutting ring consisting of cutting elements mounted for radial adjustment and of reciprocal wedge form.

5. A slitting roll for use in metal expanding machines comprising a roll body, cutting rings mounted thereon and each comprising outwardly adjustable cutting elements, spacing rings mounted between the cutting rings and means acting with clamping effect on the cutting rings and spacing rings to hold said elements against outward displacement.

6. A slitting roll for use in metal expanding machines comprising a roll body, cutting rings mounted thereon and each including outwardly adjustable cutting elements formed with apertures, spacing rings mounted between the cutting rings and formed with slots extending in the direction of adjustment of said elements, tie rods extending through said apertures and slots, and means at the ends of said tie rods cooperating therewith to exert clamping pressure on said cutting and spacing rings and thereby hold said elements against outward displacement.

7. A slitting roll for use in metal expanding machines comprising a roll body, cutting rings mounted thereon and each comprising outwardly adjustable cutting elements, spacing rings mounted between the cutting rings, means acting with clamping effect on the cutting rings and spacing rings to hold said elements against outward displacement, and other means for holding the

cutting rings and spacing rings against longitudinal displacement.

8. A slitting roll for use in metal expanding machines comprising a roll body provided with grooves extending between its ends and cutting rings, each including outwardly adjustable elements having shanks fitted in said grooves.

9. A slitting roll for use in metal expanding machines comprising a roll body provided with grooves extending between its ends and cutting rings, each composed of outwardly adjustable cutting elements, certain of which have shanks fitted in said grooves and in their outward adjustment effect the adjustment of the others.

10. A slitting roll for use in metal expanding machines comprising a roll body and cutting rings mounted thereon, each cutting ring consisting of cutting elements mounted for radial adjustment and of reciprocal wedge form, the roll body having parallel grooves extending between its ends and the cutting elements of outwardly tapering form having shanks fitted in said grooves.

11. A slitting roll for use in metal expanding machines comprising a roll body provided with grooves extending between its ends and cutting rings, each including outwardly adjustable elements having shanks fitted in said grooves in combination with shims for arrangement in said grooves under said shanks in order to effect and maintain the adjustment of said elements.

12. A slittitng roll for use in metal expanding machines having cutting rings, each consisting of cutting elements mounted for adjustment outward, with respect to the periphery of said roll and of such form as to maintain the continuity of the ring in any positions of outward adjustment, said elements having grooves extending through their working portions to their cutting edges and of such arrangement that their pitch is constant with respect to a determined concentric line in any positions of outward adjustment of said elements.

13. A slitting roll for use in metal expanding machines having cutting rings, each consisting of cutting elements mounted for radial adjustment and of reciprocal wedge form, each cutting element having a radial groove coinciding with its axes of adjustable movement and extending to its working edge.

14. A slitting roll for use in metal expanding machines having cutting rings, each consisting of cutting elements mounted for radial adjustment and of reciprocal wedge form, the elements of outwardly tapering form, each having a radial groove extending to its working edge and coinciding with its axes of adjustable movement and the elements of outwardly flaring form each having a radial groove extending to its working edge and coinciding with its axes of adjustable movement and also having a groove at each side of said radial groove and parallel thereto.

In testimony whereof we affix our signatures.

HARVEY M. GERSMAN.
WILLIAM H. KLOCKE.