No. 819,644. PATENTED MAY 1, 1906.

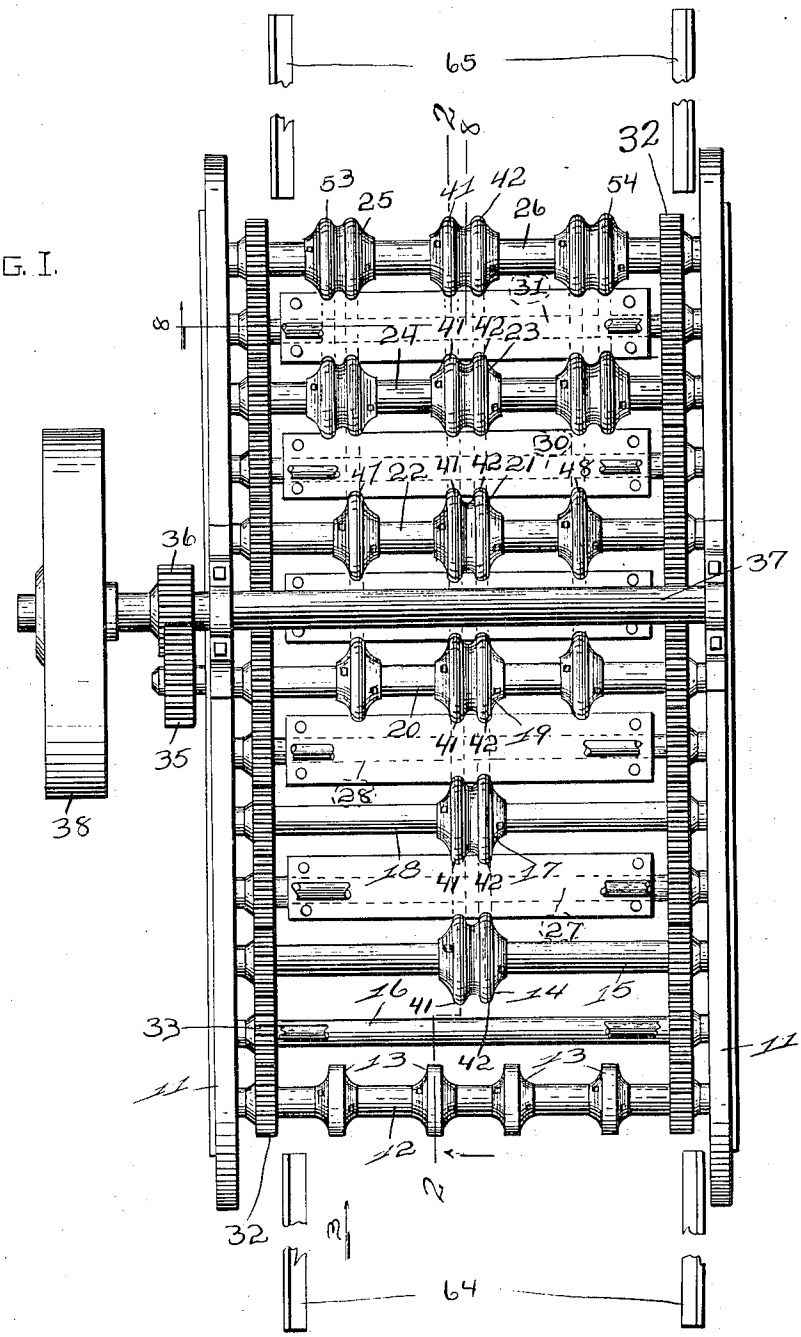
L. S. FLATAU.

SHEET METAL WORKING MACHINE.

APPLICATION FILED MAR. 6, 1905.

4 SHEETS—SHEET 1.

FIG. I.



WITNESSES—

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4 SHEETS—SHEET 2.

FIG. 2.

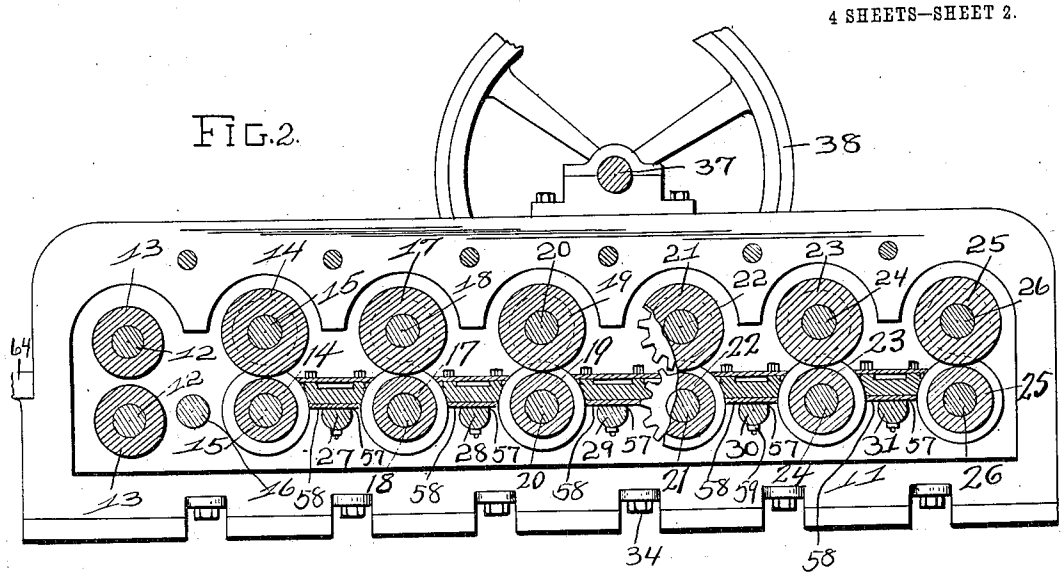


FIG. 8.

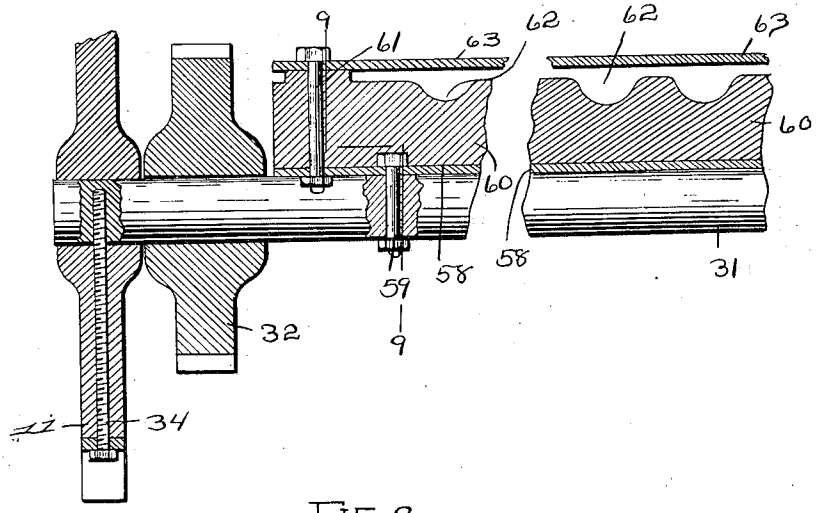
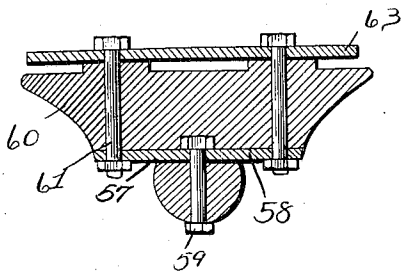


FIG. 9.



WITNESSES:

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4 SHEETS—SHEET 3.

FIG. 3.

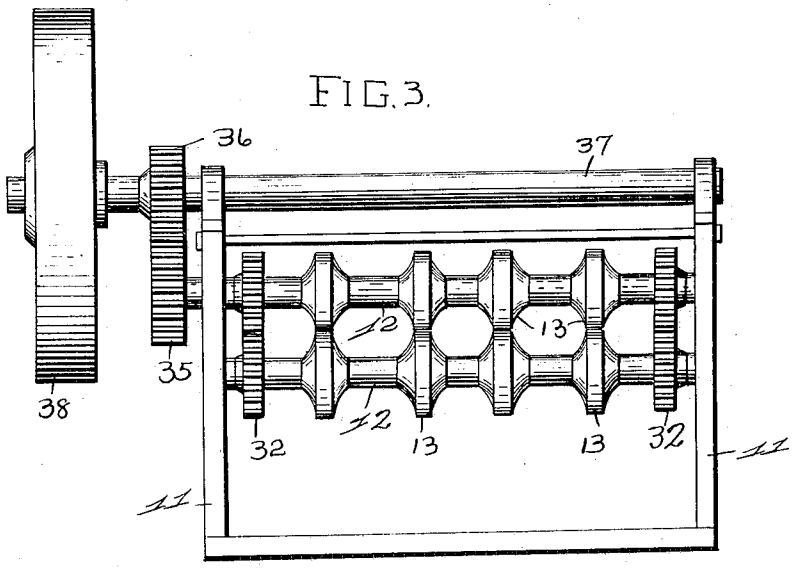


FIG. 7.

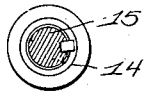


FIG. 4.

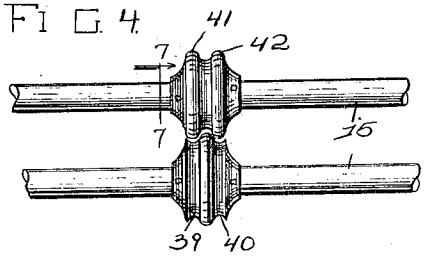


FIG. 5.

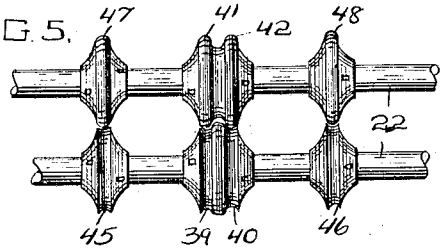
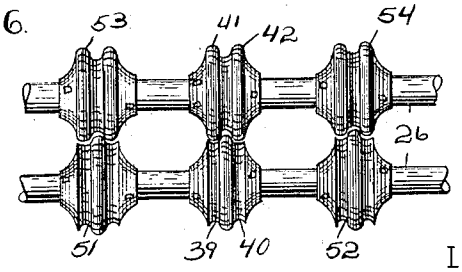


FIG. 6.



WITNESSES:

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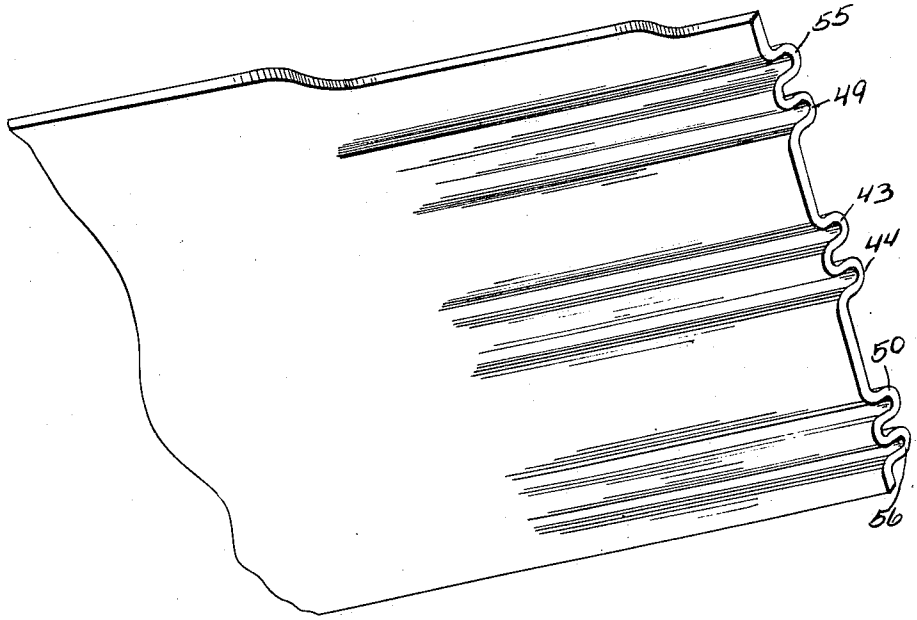
4 SHEETS—SHEET 4.

FIG. 10.



WITNESSES:

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Alfd. D. Lewis

INVENTOR:

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by Higdon & Longan & Hopkins Attys

UNITED STATES PATENT OFFICE.

LOUIS SPENCER FLATAU, OF ST. LOUIS, MISSOURI, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE REPUBLIC RAILWAY APPLIANCE CO., OF ST. LOUIS, MISSOURI, A CORPORATION OF ILLINOIS.

SHEET-METAL-WORKING MACHINE.

No. 819,644. Specification of Letters Patent. Patented May 1, 1906.

Application filed March 6, 1905. Serial No. 248,741.

To all whom it may concern:

Be it known that I, LOUIS SPENCER FLATAU, a citizen of the United States, and a resident of St. Louis, Missouri, have invented certain new and useful Improvements in Sheet-Metal-Working Machines, of which the following is a specification containing a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to sheet-metal-working machinery, my object being to construct a machine which will produce a plurality of high parallel strengthening-beads and corresponding grooves in a sheet-metal plate, said beads being formed progressively and said beads being formed first at the center of the plate and then successively both ways from the center, the successive beads being located from the central bead so that the metal will simply be bent in forming said beads and not swaged or stretched and so that said beads will be exactly parallel regardless of whether the edges of the plate were straight or parallel or not; and my invention comprises the novel features herein shown, described, and claimed.

In the drawings, Figure 1 is a top plan view of a machine embodying the principles of my invention. Fig. 2 is a longitudinal vertical section on the line 2 2 of Fig. 1 and looking in the direction indicated by the arrow. Fig. 3 is a front elevation as seen looking in the direction indicated by the arrow 3 in Fig. 1. Fig 4 is an elevation of either the first or second set of bead-rollers. Fig. 5 is an elevation of either the third or fourth set of beading-rollers. Fig. 6 is an elevation of either the fifth or sixth set of beading-rollers. Fig. 7 is a cross-section on the line 7 7 of Fig. 4 and looking in the direction indicated by the arrow. Fig. 8 is an enlarged sectional detail on the line 8 8 of Fig. 1 and looking in the direction indicated by the arrow. Fig. 9 is a cross-section on the line 9 9 of Fig. 8 as seen looking in the direction indicated by the arrow. Fig. 10 is a perspective of the sheet metal after it has passed partly through the machine and backed out.

Referring to the drawings in detail, the side pieces 11 are mounted in vertical parallel positions in any suitable way, and a pair of feed-roller shafts 12 is mounted in vertical alinement at the forward ends of said side pieces. Mating feed-rollers 13 are mounted upon the shafts, the rollers of the upper shaft being in contact or in opposition to the rollers of the lower shaft, so as to grip the sheet of metal and force it through the machine. The first pair of bead-forming rollers 14 is mounted upon the shafts 15, the rollers being located at the longitudinal centers of the shafts and mounted rigidly upon the shafts in any suitable way.

In Fig. 7 I have shown a roller splined upon the shaft to hold it against rotation, and in the other figures I have shown set-screws to hold the rollers against longitudinal movement of the shafts. An idler-shaft 16 is located between the lower shafts 12 and 15. A second pair of bead-forming rollers 17 is mounted upon the pair of shafts 18 in longitudinal alinement with the rollers 14. A third set of bead-forming rollers 19 is mounted upon the pair of shafts 20. A fourth set of bead-forming rollers 21 is mounted upon the pair of shafts 22. A fifth set of bead-forming rollers 23 is mounted upon a pair of shafts 24, and a sixth set of bead-forming rollers 25 is mounted upon the shaft 26. A second idler-shaft 27 is mounted between the lower shafts 15 and 18. A third idler-shaft 28 is mounted behind the lower shaft 18. A fourth idler-shaft 29 is mounted behind the lower shaft 20. A fifth idler-shaft 30 is mounted behind the lower shaft 22, and the sixth idler-shaft 31 is mounted between the lower shafts 24 and 26.

Spur-gears 32 are fixed upon each end of each of the bead-forming roller-shafts and upon each end of each of the feed-roller shafts, and idler-gears 33 are loosely mounted upon each end of each of the idler-shafts, so as to connect the active shafts together by two trains of gears.

The idler-shafts have their ends mounted through the side pieces 11, as shown in Fig. 8, and screws 34 are inserted through the side pieces into the shafts to hold the idler-shafts against rotation.

A spur-gear 35 is fixed upon the upper one of the shafts 20 outside of the frame, and the spur-gear 36, fixed upon the driving-shaft 37, meshes with the gear 35. The belt-wheel 38 drives the shaft 37.

The central bead-forming rollers consists

of grooves 39 and 40 on the lower rollers and enlargements 41 and 42 upon the upper rollers to fit in the grooves 39 and 40. The first pair of rollers 14 will start the beads 43 and 44 and the second pair of rollers 17 will finish the beads 43 and 44. In other words, the first pair of rollers fits loosely and the second pair fits tightly. The shafts 20 and 22 carry central rollers corresponding to the rollers of the shafts 15 and 18, said central rollers serving as guides for the sheet metal and as a means of feeding the sheet to the next rollers, and these rollers 20 and 22 also carry the intermediate bead-forming rollers consisting of the rollers having grooves 45 and 46 and rollers having enlargements 47 and 48 to fit in the grooves 45 and 46. The rollers for forming the intermediate beads on the shafts 20 fit loosely and the corresponding rollers on the shafts 22 fit tightly, and these rollers form the beads 49 and 50. The rollers for forming the outer beads have grooves 51 and 52 and enlargements 53 and 54 to fit in the grooves 51 and 52, said rollers carried by the shafts 24 fitting loosely and those carried by the shafts 26 fitting tightly, forming the beads 55 and 56.

Each of the idler-shafts 27 28 29 30 31 has a flattened upper face 57, and the guide-supporting plates 58 are secured to said shafts by bolts 59. The guide-blocks 60 are secured to the plates 58 by bolts 61. The upper faces of the guide-blocks 60 have grooves 62 to receive the beads. The bolts 61 are also inserted through the cap-plates 63, said plates serving to hold the sheet down upon the guide-blocks. The first two guide-blocks mounted upon the shafts 27 and 28 are grooved to receive the center beads 43 and 44. The next two guide-blocks mounted upon the shafts 29 and 30 are grooved to receive the center beads 43 and 44 and also the intermediate beads 49 and 50, and the last guide-block mounted upon the shaft 31 is grooved to receive all of the beads. These guide-blocks serve to guide the sheet metal from one set of rollers to the next, the grooves in the guide-blocks matching the beads in the sheet metal serving to prevent lateral motion and the cap-plates serving to hold the sheet metal down upon the guide-blocks.

Angle-irons 64, mounted in any suitable way, serve as a feed-table to guide the sheet metal to the feed-rollers, and similar angle-irons 65, mounted in any suitable way, serve as a delivery-table to receive the grooved sheet of metal.

Thus it will be seen that by the use of my machine I can take a sheet-metal plate, place it upon the feed-table, feed it to the feed-rollers, and that the machine will then take care of the plate, forming two strengthening-beads at the center of the plate progressively and simultaneously, then pass on and form an intermediate groove one upon each side of the center progressively and simultaneously, then pass to the finishing-rollers, which will form the outside grooves progressively and simultaneously, and then pass to the delivery-table.

It is intended that the last set of rollers shall fit tighter than the preceding rollers, so as to take all wrinkles, bends, and unevenness out of the sheet of metal.

Forming the grooves successively both ways from the center does not swage or stretch the metal, but simply bends it.

The progress of forming the beads is illustrated in Fig. 10.

By mounting the bead-forming rollers adjustably upon the shafts the beads may be made closer or farther apart by adjusting the rollers, and the number of beads may be increased or decreased by removing or adding to the number of rollers.

I claim—

1. In a sheet-metal-working machine: a series of pairs of shafts mounted in alinement; bead-forming rollers at the centers of the first pair of shafts; intermediate bead-forming rollers upon the second pair of shafts; and a guide between the first and second pairs of shafts; said guide comprising an idler-shaft flattened on its upper face, a supporting-plate bolted to the idler-shaft, a guide-block bolted to the supporting-plate and having grooves in its face, and a cap-plate bolted to the guide-block, so that the sheet metal in passing from the first pair of rollers to the second pair of rollers must pass under the cap-plate in engagement with the guide-block; substantially as specified.

2. In a sheet-metal-working machine: a series of pairs of shafts mounted in alinement; idler-shafts rigidly mounted between the pairs of shafts; trains of gearing upon each end of each shaft, and upon each end of each idler-shaft, so as to connect the shafts all together; feed-rollers upon the first pair of shafts; central bead-forming rollers upon the second and third pairs of shafts to form the central beads progressively; central bead-forming rollers upon the fourth and fifth pairs of shafts; intermediate bead-forming rollers upon said fourth and fifth pairs of shafts to form intermediate beads progressively; outer bead-forming rollers upon the sixth and seventh pairs of shafts to form the outer beads progressively; and guides leading from one bead-forming roller to the next, each of said guides comprising a guide-block having grooves to match the beads previously formed, and a cap-plate to hold the sheet metal upon the guide-block; substantially as specified.

3. In a sheet-metal-working machine, a frame, a series of bead-forming rollers arranged in pairs in said frame, means whereby said rollers are simultaneously driven, guide-

blocks extending from one pair of rollers to the other, there being grooves formed in said blocks to correspond with the ribs on the rollers, and plates removably positioned on top of the guide-blocks; substantially as specified.

4. In a sheet-metal-working machine, bead-forming rollers arranged in pairs to form beads in the sheet-metal plate progressively and successively from the longitudinal center of the plate, transverse bars arranged between each pair of bead-forming rollers, guide-blocks positioned on the transverse bars in which guide-blocks are formed grooves to correspond with the ribs on the adjacent rollers, and caps removably positioned upon the guide-blocks; substantially as specified.

5. In a sheet-metal-working machine, the combination with a series of bead-forming rollers arranged in pairs, of guide-block supports arranged between each pair of rollers, and covered guide-blocks detachably mounted on the supports, through which guide-blocks are formed grooves corresponding to the ribs on the adjacent rollers; substantially as specified.

6. In a sheet-metal-working machine, the combination with a series of bead-forming rollers arranged in pairs, of supports arranged between each pair of rollers, plates mounted upon said supports, guide-blocks rigidly fixed to said plates in which guide-blocks are formed grooves to correspond with the ribs on the adjacent rollers, and plates detachably secured to the tops of the guide-blocks; substantially as specified.

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses.

LOUIS SPENCER FLATAU.

Witnesses:

EDW. M. HARRINGTON,

JOHN C. HIGDON.