

Nov. 24, 1931.

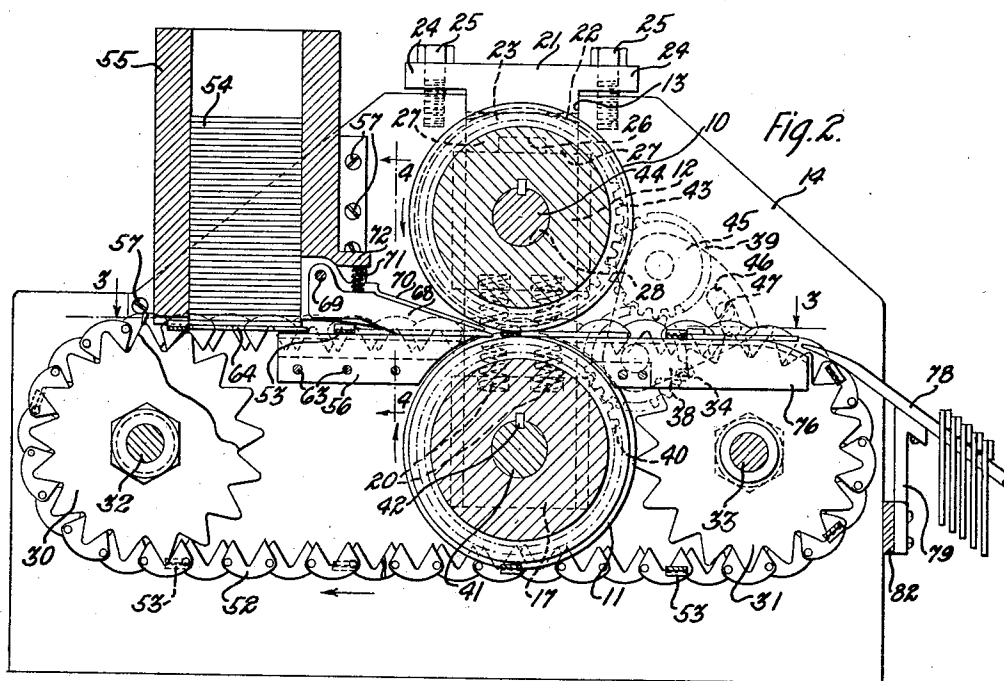
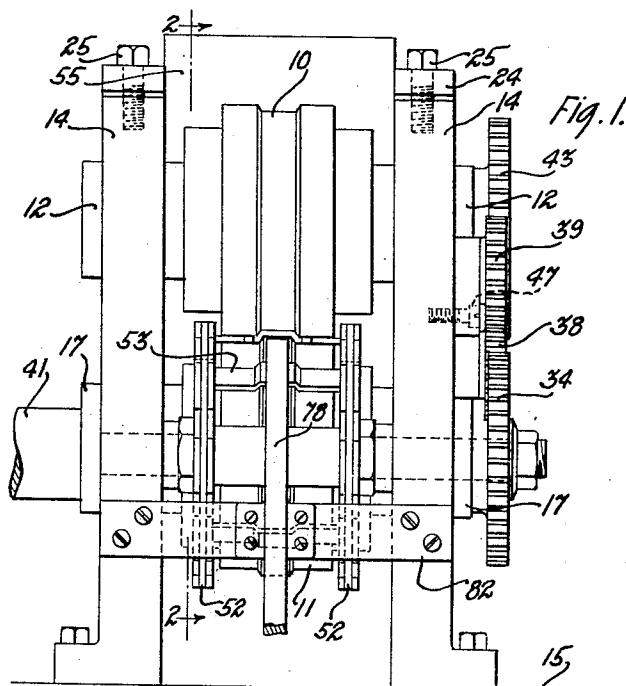
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1,833,656

MATERIAL FORMING APPARATUS

Filed Feb. 10, 1928

2 Sheets-Sheet 1



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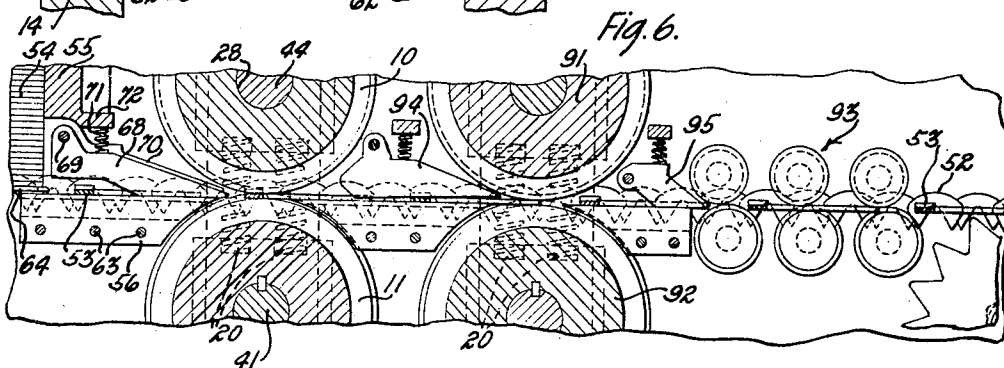
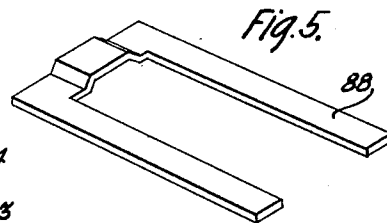
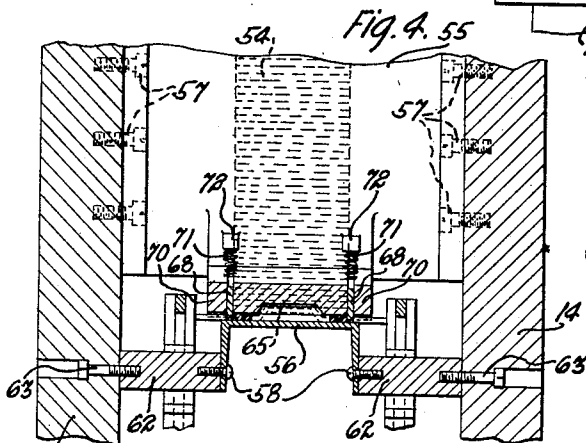
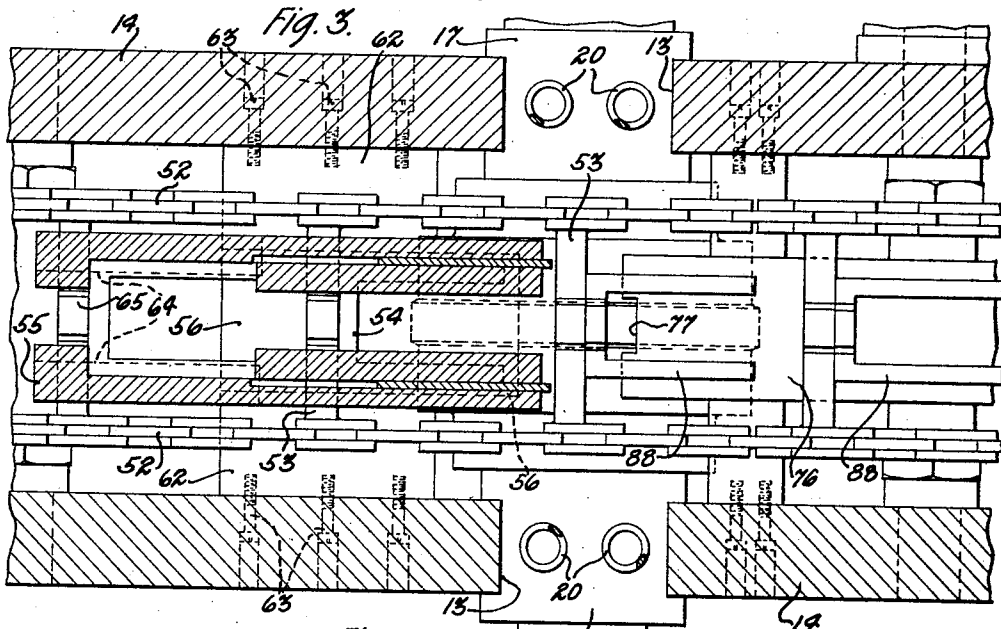
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MATERIAL FORMING APPARATUS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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MATERIAL FORMING APPARATUS

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This invention relates to material forming apparatus, and more particularly to a material forming apparatus having an improved device for feeding material through forming members.

The primary object of the invention is to provide an apparatus of simple and durable construction for rapidly positioning and expeditiously conveying parts through a material working mechanism.

In accordance with the general features of the invention, one embodiment thereof consists of a pair of endless chain conveyors passing along each end of forming rolls and carrying interconnecting members having the same contour as the part to be formed, which feed the blanks from the bottom of a magazine along a table through the forming rolls and deposit the formed parts in a predetermined position upon a receiving rod for stacking.

Other objects and advantages of the invention will more fully appear from the following description taken in connection with the accompanying drawings, in which

Fig. 1 is an end elevational view of rotary forming rolls showing in association therewith an endless chain feeding device embodying the features of this invention;

Fig. 2 is a section thereof taken on lines 2—2 of Fig. 1, with parts broken away to show the supporting and guiding mechanism;

Fig. 3 is an enlarged fragmentary section taken on lines 3—3 of Fig. 2;

Fig. 4 is a fragmentary section taken on lines 4—4 of Fig. 2;

Fig. 5 is an enlarged perspective view of a part after passing through the forming rolls, and

Fig. 6 is a modification of the invention showing the feeding device adapted to feed the parts through two sets of forming rolls and an apparatus for straightening the formed parts.

Referring now to the drawings in which like numerals designate similar parts in the several views, forming rolls 10 and 11 are rotatably supported in journal boxes 12—12 and 17—17 respectively which are slidably

mounted in slots 13—13 in side frames 14—14. These vertical side frames are securely fastened to a base 15. The forming rolls are prevented from contacting when idle by springs 20—20 interposed between the upper and lower journal boxes 12—12, 17—17. The lower journal boxes rest upon the frame and the upper journal boxes are retained in operative forming position by the flat surface of a T-shaped clamp 21 pressing against a slightly convex surface 22 of a member 23 interposed between the T-shaped member and the journal boxes which has a rectangular transverse slot 26 thereby forming two depending parts 27—27. These depending parts 27—27 bear upon the upper journal box 12, and with the assistance of the convex surface 22 they are adapted to distribute the pressure directly over the solid portions of the journal box in order to protect a circular bearing surface 28 therein from distortion. Lugs 24—24 of the T-shaped clamp 21 have suitable openings through which extend threaded bolts 25—25 engaging threaded apertures in the frame members 14. By turning the bolts 25 the springs 20 interposed between the rolls can be compressed and any desired distance between the rolls 10 and 11 can be obtained.

For the purpose of providing feeding means for supporting the parts to be worked in alignment with the top surface of the lower forming roll 11, the upper peripheries of sprocket wheels 30—30 and 31—31 are mounted in horizontal alignment on either side thereof and are rigidly secured to rotatable shafts 32—33 which are suitably journaled in the frames 14—14. To effect the rotation of the sprocket wheels 31—31, the supporting shaft 32 extends beyond the right hand frame 14 and is provided with a spur gear 34 which is rigidly fastened to the shaft. This gear 34 meshes with an idler gear 38 which in turn meshes with a similar gear 39 and gear 40 fixed to a reduced end of the driven shaft 41. The lower forming roll 11 is secured by a key 42 to the power shaft 41, to which power from any suitable source may be applied for the purpose of driving the apparatus. The idler gear 39 meshes with a gear 43 which is fastened to a shaft 44 sup-

porting the upper forming roll 10. The idler gears 38 and 39 are mounted on a plate 45 which is made adjustable as to position by means of a slot 46. A screw 47 threaded into the frame 14 and passing through the slot 46 is adapted to clamp and hold the plate 45 in operating position so that the idler gears may properly mesh with their associated gears. Thus, by the instrumentality of the transmission described it will be manifest that power will be imparted from the single power shaft 41 to the rolls 10 and 11 and sprockets 31—31 to cause the rolls and the endless sprocket chains 52—52 to move in the direction indicated by the arrow in Fig. 2.

The pair of endless sprocket chains 52—52 which are driven by the sprockets 31—31 are interconnected at regular intervals by transverse members 53 having the same shape as the periphery of the forming rolls 10—11. These transverse members feed the blanks 54 from the bottom of a magazine 55 along a table 56 through the forming rolls 10—11. The magazine 55 is secured to the frames 14 by screws 57 (see Fig. 4) and the table 56 is supported by screws 58 threaded into rectangular plates 62 which are in turn rigidly fastened to the side frames 14 by screws 63. The magazine 55 is equipped on its underside with a pair of spaced support strips 64—64 (see Fig. 3) which hold the blanks in the magazine and permit a raised portion 65 of the transverse member 53 to pass therebetween and remove the bottom blank from the magazine.

Interposed between the magazine and the forming rolls, a pair of guide fingers 68 for guiding the blanks into the rolls are pivoted at 69 in a lip portion 70 of the magazine structure. The guide fingers 68 are maintained in contact with the table 56 by means of compression springs 71 which are retained between projections 72 of the magazine 55 and the top surfaces of the fingers. This construction permits the transverse feed members 53 to ride under the guide fingers as these members 53 feed blanks through the forming rolls.

On the discharge side of the forming rolls, a table 76 is secured to the frames 14 in a similar manner as previously described for the table 56 located on the feed side of the same rolls. This table 76 serves as a support for the formed parts as they issue from the forming rolls. The table is cut out at 77 as shown in Fig. 3 to permit the elevated periphery of the roll 11 to pass; the table is thereby kept very close to the rolls to assure the formed parts being properly guided toward the stacking means which will presently be fully described.

The stacking means comprises a stacking rod 78 which is secured at a desired angle to a standard 79 fastened to a cross-plate 82 fixed to the frames 14. The stacking rod 78

is so positioned that its curved end terminates at the edge of the table 76 and clears the transverse members 53 as they push the formed parts off of the table on to the rod and continuously pass around the sprockets 31. The formed parts have the same contour as part 88 shown in Fig. 5 and it will be seen that they are readily engaged by the stacking rod 78.

In the operation of the apparatus the transverse feed members 53 of the revolving chains 52 pass under the magazine 55 and each feed member 53 removes a bottom blank 54 therefrom by means of the raised portion 65; the blanks are guided along the table 56 by the guide fingers 68 as soon as they leave the magazine and until they are engaged by the forming rolls 10—11. As the feed members 53 engage the guide fingers 68 they are raised against the compression of the springs 71 and as soon as one feed member passes the guide fingers snap back into position to guide the next blank as it issues from the magazine. The transverse feed member, having the same shape as the periphery of the forming rolls, passes through the rolls and advances the formed part on the table 76 and from there discharges the part on to the stacking rod 78.

A modified form of the invention is delineated in Fig. 6 wherein transverse feed members 53 attached to the sprocket chains 52—52 are adapted to carry blanks through forming rolls 10—11, another set of forming or stamping rolls 91—92 and straightening rolls 93 which have peripheries of the same shape as the formed part, similar to the rolls 10—11 shown in Fig. 1. Guide fingers 94—94 and 95—95 are placed respectively after guide rolls 10—11 and rolls 91—92 to guide the parts from one forming operation to the next. These guide fingers are of the same construction as previously described of fingers 68—68. The upper forming roll 91 and the upper rolls of the straightening mechanism 93 are supported and made adjustable in a manner similar to that already described for roll 10. The moving elements are driven from the power shaft 41 by suitable gearing (not shown). The above described arrangement expedites the rapid working of blanks in a succession of forming operations, thereby economically producing a finished part in one handling operation.

Although the invention as herein described and illustrated is particularly well adapted for use in connection with forming flat blanks into a desired shape, it should be understood that the novel features are capable of many other applications and modifications and should be limited only by the scope of the appended claims.

What is claimed is:

1. In a material working apparatus having means provided with forming surfaces,

a magazine containing parts to be formed, and means having substantially the same contour as the forming surfaces of said means for conveying a part from the magazine to a point where it is acted on by the forming means.

2. In a material working apparatus, a plurality of forming means for successively forming a blank of material, straightening rolls having peripheries of the same shape as the formed part, and means having the same contour as the formed part of the blank for carrying the blank through the above mentioned means successively.

3. In a material working apparatus, a plurality of forming means for successively forming a blank of material, means for guiding the blank in the successive operations, rolls having peripheries of the same shape as the formed part for straightening said part, and means having the same contour as the formed part for carrying the blank through the above mentioned means.

4. In a material working apparatus having means provided with forming surfaces, an endless chain conveyor having connecting members of the same contour as the forming surfaces, common means for driving the material working apparatus and the conveyor, a receiving means, and means for delivering the formed part in a predetermined position to the receiving means.

5. In a material working apparatus having forming rolls, a plurality of endless chains, and a plurality of spaced members having the same contour as the forming surfaces of the forming rolls and attached to the endless chains for carrying parts to be formed through the forming rolls.

6. In a material working apparatus having means provided with forming surfaces, a magazine for holding parts to be formed, a plurality of endless chains interconnected by members having the same contour as the forming surfaces for removing a part from the magazine, and means for driving the chains to carry the parts to be formed at predetermined intervals through the material working apparatus.

7. In a material working apparatus, forming rolls, a magazine for holding parts to be formed, a pair of endless chains adapted to pass between the forming rolls, bars having the same contour as the formed portion of the part for maintaining the endless chains in spaced relationship and for removing a part from the magazine to carry it through the forming rolls, means for driving the endless chains, a receiver, and means for delivering the formed parts in a predetermined position to the receiver for stacking.

8. In a material working apparatus having means provided with forming surfaces, a magazine containing parts to be formed, a

guide for directing a part in proper position to the forming surfaces, and means having the same contour as the forming surfaces of said means for conveying a part there-through.

9. In a material working apparatus having means provided with forming surfaces, a magazine containing parts to be formed, a table for supporting the parts as they leave the magazine, means having the same contour as the forming surfaces for feeding a part therethrough, a guide finger pivoted nearest the point of feeding for directing a part in proper position through the forming surfaces, and a spring for maintaining the finger in contact with the table and permitting the feeding means to ride under the finger as said feeding means forces the part through the forming surfaces.

10. In an apparatus for forming blanks, a pair of cooperating forming rolls adapted to impart a predetermined cross-sectional shape to a flat blank passed therebetween, an advancing member for the blanks having a cross-sectional shape identical to that of the formed blanks, and means for passing the advancing member between the rolls.

11. In an apparatus for forming flat blanks, a pair of cooperating forming rolls having complementary forming surfaces shaped as surfaces of rotation with their radii varying irregularly from one end of the rolls to the other, an advancing member for the blanks shaped to pass between the rolls, and means for advancing the advancing member between the rolls to feed a blank to the rolls.

12. In an apparatus for forming blanks, a pair of cooperating rolls having forming surfaces so shaped that the contiguous portions of the forming surfaces are equidistant at all points, an advancing member for the blanks shaped to pass between the rolls and means for advancing the advancing member between the rolls to feed a blank to the rolls.

13. In an apparatus for forming blanks, a pair of cooperating rolls having irregular complementary forming surfaces so shaped that the contiguous portions of the forming surfaces are equidistant at all points, a pair of endless conveyors positioned at opposite ends of the forming surfaces, and an advancing member carried by said conveyors and shaped to pass between the rolls.

14. In an apparatus for forming blanks, a pair of cooperating rolls having irregular complementary forming surfaces so shaped that the contiguous portions of the forming surfaces are equidistant at all points, a pair of spaced conveyors positioned at opposite ends of the forming surfaces, an advancing member carried by the conveyors and shaped

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to pass between the rolls, and means positioned forwardly of the rolls for removing the formed blanks from the advancing member.

5 In witness whereof, I hereunto subscribe my name this 26 day of January A. D., 1928.
CHARLES EDWIN NELSON.

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