June 8, 1954

J. J. INGELS

2,680,466

MULTIPLE ROLLING MECHANISM

Original Filed May 7, 1947

2 Sheets-Sheet 1

Fig. 1

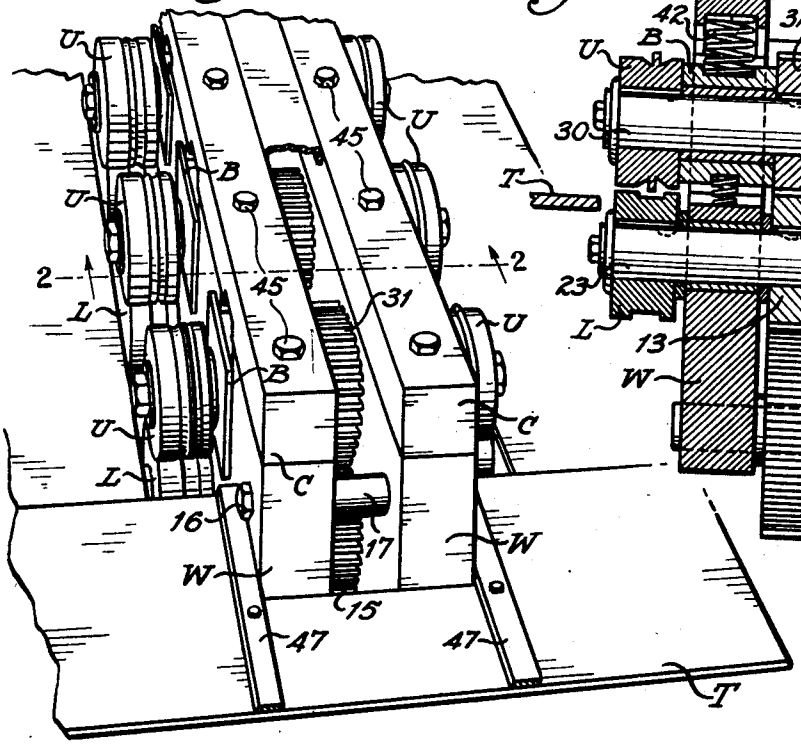


Fig. 2

Fig. 3

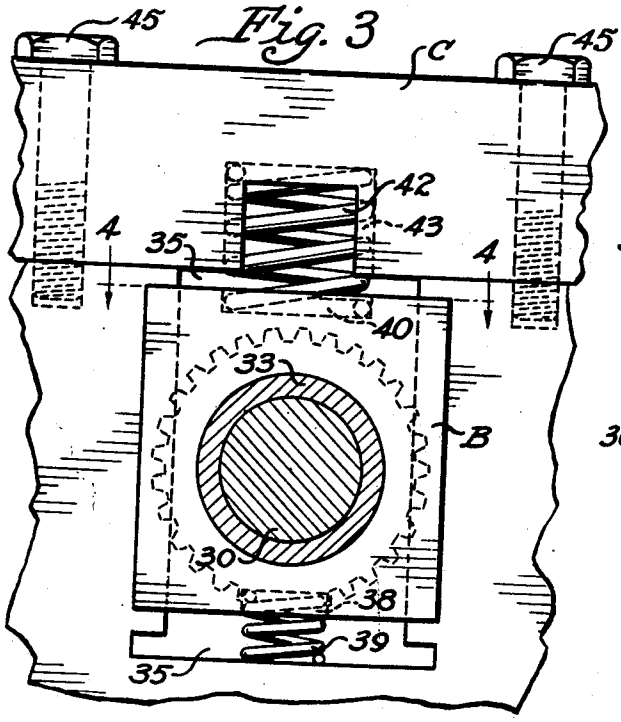
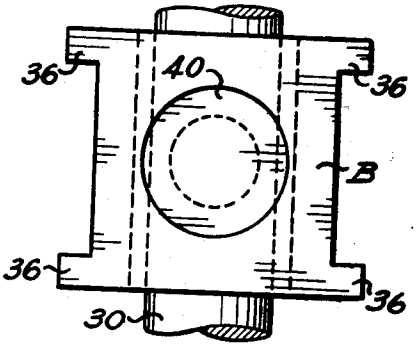


Fig. 4



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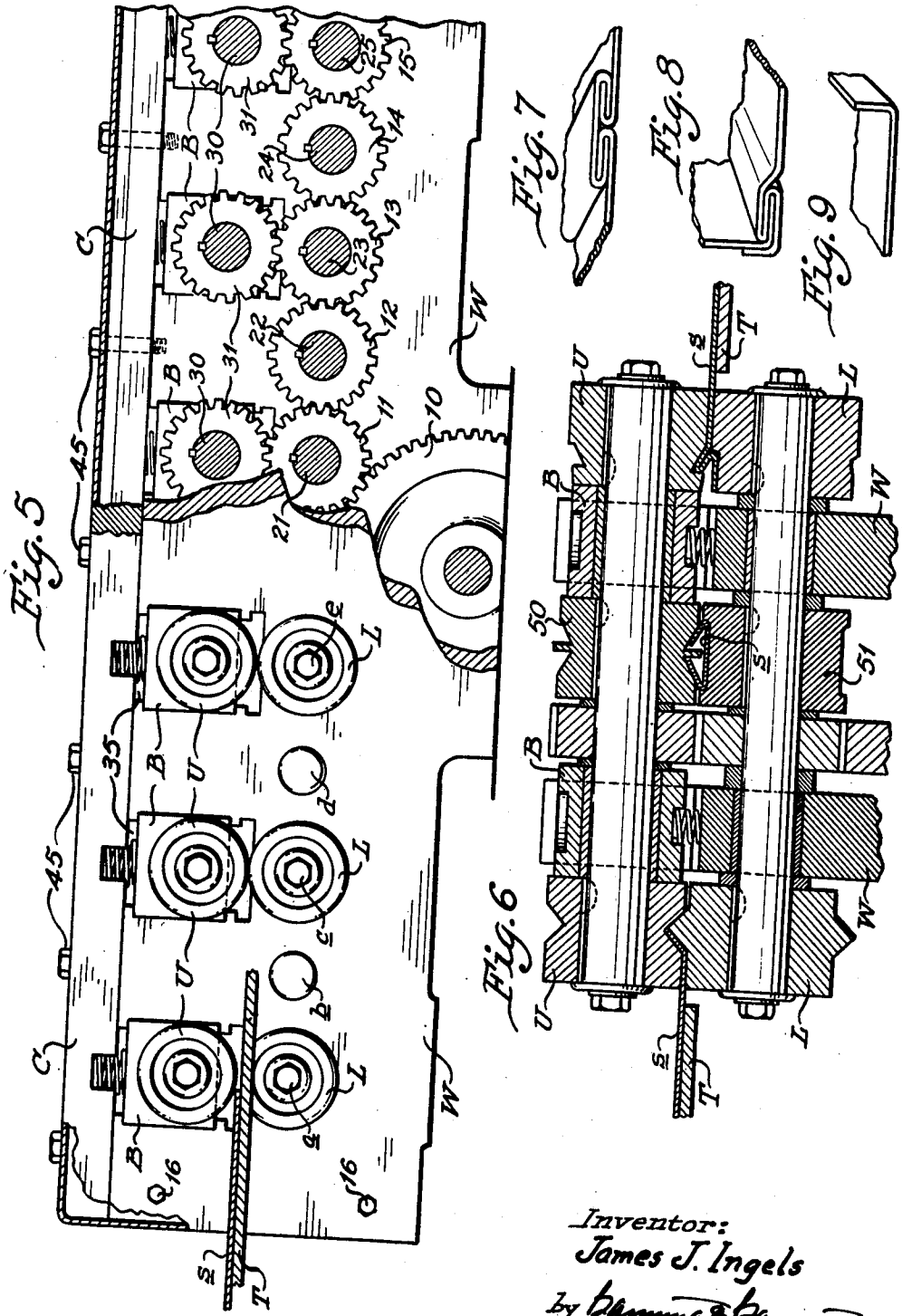
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MULTIPLE ROLLING MECHANISM

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Original application May 7, 1947, Serial No. 746,499, now Patent No. 2,588,120, dated March 4, 1952. Divided and this application January 4, 1952, Serial No. 264,966

4 Claims. (Cl. 153—2)

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This invention relates to a rolling machine for operating upon metallic sheets or strips to produce desired cross sectional changes in the contour thereof. The machine comprises plural sets of companion rolls, one above the other, the lower rolls being journaled in fixed bearings and the upper rolls being journaled in bearings which are individually floated in a common frame. The improvements which characterize the present invention are directed in large part to the mountings for the bearings in the frame whereby the rolls which are journaled therein may cooperate with the remaining rolls in both sets to produce a more satisfactory operation upon the metallic sheets or strips as they are advanced successively through the machine.

These and other objects of my invention will appear from the description to follow, taken in conjunction with the accompanying drawings wherein:

Figure 1 is a fragmentary view in perspective of the machine, showing the parts thereof which appear above the work supporting table;

Fig. 2 is an enlarged detail in section taken on line 2—2 of Fig. 1;

Fig. 3 is a detail in section, taken on line 3—3 of Fig. 2;

Fig. 4 is a similar view, taken on line 4—4 of Fig. 3;

Fig. 5 is a side elevational view, partly in section, showing the arrangement of upper and lower sets of rolls lengthwise of the machine;

Fig. 6 which is a view similar to Fig. 2, shows a modification in the roll arrangement; and

Figs. 7, 8, and 9 are fragmentary perspective views each showing one kind of edge conformation that may be produced advantageously with a machine embodying the present invention.

I provide in the machine herein illustrated a work table T which surmounts a supporting cabinet wherein may be contained a motor (not shown) and driving mechanism which includes a main driving gear 10 in mesh with a gear 11 which is entrained with other gears 12, 13, 14, and 15. Other gears (not shown) to the left of center of Fig. 5 may also be included in a second train driven by the same main gear 10. Both trains of gears are extended longitudinally of the machine between a pair of frame walls W which rise from a supporting base (not shown). As by means of bolts 16 extending between these walls, and sleeves 17 carried by the bolts between the walls, I provide for maintaining them a fixed distance apart. The table may be sectional so as to accommodate in its center region the frame walls W together with the two gear trains therebetween.

The first train of gears 11, 12, 13, 14, and 15 are mounted fast on shafts 21, 22, 23, 24, and 25, respectively, whereas those in the second train are mounted fast on shafts whose axes are designed respectively as *a*, *b*, *c*, *d*, and *e*. All of these shafts are extended transversely through the frame walls and are journaled for rotation within suitable bearings therein. The shafts 21, 23 and 25, also the shafts whose axes are denoted as *a*, *c* and *e*, are of sufficient length to extend outwardly beyond the frame walls to carry operating rolls L at their opposite ends. The intermediate shafts, viz. 22, 24 and those whose axes are denoted as *b* and *d*, are provided to carry the inbetween gears (such as 12 and 14) to complete the train and provide for a unidirectional rotation of all the shafts which mount the operating rolls L. From this point on I will treat the two trains of gears as a single system, since all the gears operate in unison in response to motion transmitted from the driving gear 10.

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The rolls L carried by the shafts above noted may be all alike. They constitute together a lower set of rolls. The description to follow will deal mostly with a single lower roll L and its companion upper roll U, it being understood that the upper set will comprise the same number of rolls as the lower.

Each upper roll U is mounted fast on a shaft 30 (see Fig. 2) which extends transversely through the two frame walls. Secured to each shaft 30 is a gear 31 which is positioned between the two frame walls, each gear 31 being in meshing relation with an alternate gear in the train already described. By some such means as this, I provide for driving the upper set of rolls U in unison with the rolls L in the lower set, the latter being in coacting relation with each alternate gear in the train which interconnects them all.

Each shaft 30 which mounts a pair of upper rolls U is journaled for rotation in a bearing 33 carried in a block B (see Figs. 3–5) which is positioned within a slot 35 that extends downwardly from the top of one of the frame walls W. Since these slots and the blocks fitted therewithin are the same for the two frame walls, a description of but one will be necessary. Each block is provided at opposite vertical ends with spaced outwardly extended flanges 36 adapted to overlie the proximate faces of the frame wall when fitted in place. On its underface each block is socketed at 38 to accommodate the upper end of a compression spring 39 whose lower end is in thrust engagement with the bottom of the slot (see Fig. 3). In this way the bearing block B may be resiliently supported within the slot of the frame wall W, the flanges 36 serving as guides to confine the block movements to a vertical plane.

The top face of each block B is also socketed at 40 to form a seat for the lower end of a second compression spring 42 whose upper end is fitted within a socket 43 on the underface of a cap bar C which overlies one of the frame walls W to which it is fixedly secured as by stud bolts 45. By the means described, the upper compression

spring 42 in opposition with the lower spring 39 will provide a resilient floating mounting for the bearing block B therebetween.

In operation, a set of rolls of desired peripheral contour will be mounted on the upper and lower shafts, so as to receive between them the metal strips or sheets which are to be operated upon. These sheets are adapted to be slid lengthwise along guides 47 which may be affixed to the table T at desired places. The table height is fixed so as to be close to the nip between the upper and lower sets of rolls whereby the work *s* supported thereon will be correctly positioned to enter therebetween.

As is well-known in the sheet metal working art it is possible to produce many different cross-sectional forms and interlocks in strips or sheets that are operated upon. Three such contours are suggested in Figs. 7, 8, and 9, the first showing a drive cleat interlock with the turned edges of a pair of adjacent sheets, the second a Pittsburgh lock, and the third a standing edge. Any of these different forms, also various others, may be produced expeditiously by the present machine.

Although the arrangement shown in Figs. 1 and 2 provides for a pair of operating rolls at opposite ends of each upper and lower shaft, disposed to the outside of the spaced frame walls W, it may be advantageous to affix to each upper and lower shaft a third roll 50 and 51, respectively, which will be positioned between the two frame walls. An example of this noted in Fig. 6. In a set-up of this kind, the strips *s* to be operated upon by the intermediate upper and lower rolls are fed through the machine between the spaced frame walls W which may serve as a guiding means therefor. The three sets of rolls illustrated in Fig. 6 are peripherally contoured to produce bends in the work corresponding to the showings in Figs. 7, 8 and 9, the rolls of Fig. 6 (reading from left to right) being designed to provide a standing edge, a drive cleat, and a Pittsburgh lock, respectively.

In operation, the varying conditions to be encountered will require that one set of rolls yield with respect to the other as the work advances through between them. For this purpose I have provided the spring supported bearing blocks for one set of rolls—the upper ones, for example. The floating mounting provided for each bearing block is such as to provide a normal predetermined distance of separation between its associated roll and the one that is companion thereto, so that the work advanced therebetween may be operated upon in the intended manner. The relative strengths of the opposing springs between which each block is floated is also an important factor to be taken into account in this connection.

The normal clearance between the upper and lower forming rolls may be about .015". When a sheet heavier than this thickness is passed between the rolls, then the floating upper roller may rise as required to accommodate such a sheet. The range of movement is normally rather slight—not enough to produce any appreciable tilting of an upper shaft so as to affect the operation of the roll at the opposite end.

The entire assembly and arrangement of operating parts which are included in the present machine is simple and effective to meet varying conditions. The floating movement of the upper rolls is confined by the vertical guideway within which the bearing blocks are fitted. In case of any replacements or repairs, it is necessary only to remove one or both of the cap bars whereupon any one or more of the upper roll assemblies is fully accessible or available for replacement. To protect the gear train between and the two frame walls I may fit a closure strip between them along the top ends, as shown.

This invention was first disclosed in my application Serial No. 746,499, filed May 7, 1947, now Patent No. 2,588,120, granted March 4, 1952, of which this case is a division.

I claim:

1. In a multiple rolling machine including a frame having substantially parallel fixed side walls, a plurality of transverse first shafts rotatably extending between and beyond said walls and a shaping roll on each end of a shaft, a gear train positioned between the walls with each gear having a thickness only slightly less than the space between the walls, certain of said gears being attached to said first shafts for rotation thereof in the same direction, a plurality of pairs of substantially transversely aligned blocks each movable within a slot extending downwardly from the top edge of a wall, a plurality of second shafts each extending transversely of the frame and each rotatably supported in one of said pairs of blocks, a shaping roll on the end of each second shaft cooperating with a roll on a first shaft, gears on said second shafts operatively engaging the gears of the gear train for rotation of said second shafts and each having a thickness only slightly less than the space between the walls, removable closure members on the tops of the walls closing the open tops of said slots, a relatively strong spring of fixed maximum length extending between a closure member and the adjacent portion of each block, and a relatively weak compression spring extending between the bottom of each recess and the adjacent portion of each block holding the block against the strong spring and thereby providing a predetermined spacing between the rolls of each cooperating pair of rolls.

2. The rolling machine of claim 1 wherein each block is provided with side flanges overlapping the adjacent side portion of its walls for retaining the block in its slot.

3. The rolling machine of claim 1 wherein each block is provided wtih a spring-receiving recess at each of its top and bottom edges.

4. The rolling machine of claim 1 wherein the removable closure members of each wall is in the form of a single cap bar extending across all said slots, with each cap bar including a plurality of recesses each receiving the upper end of one of the strong springs.

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