Aug. 7, 1945. E. E. DAVIS ET AL 2,381,807

METHOD OF AND MEANS FOR REMOVING BURR FROM STRIPS

Filed Oct. 15, 1942 2 Sheets-Sheet 1

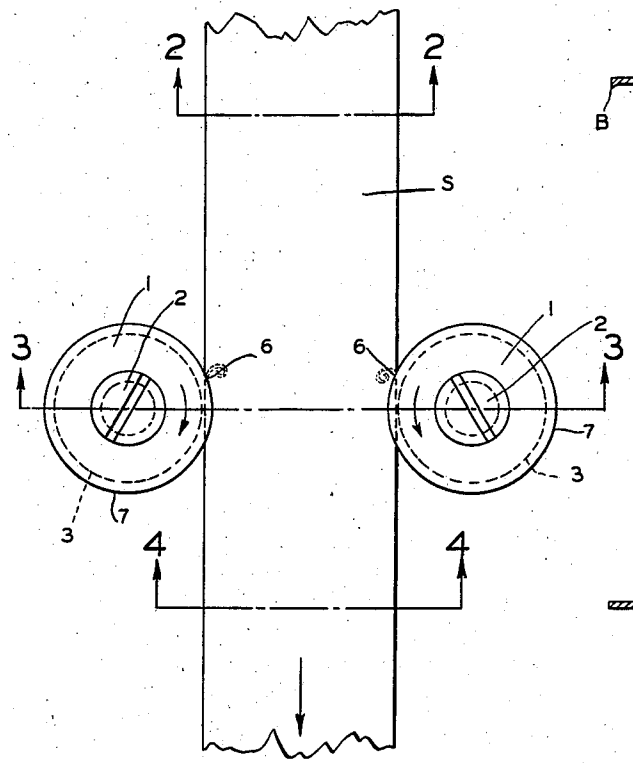



FIG. 1.

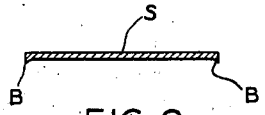



FIG. 2.

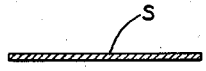



FIG. 4.

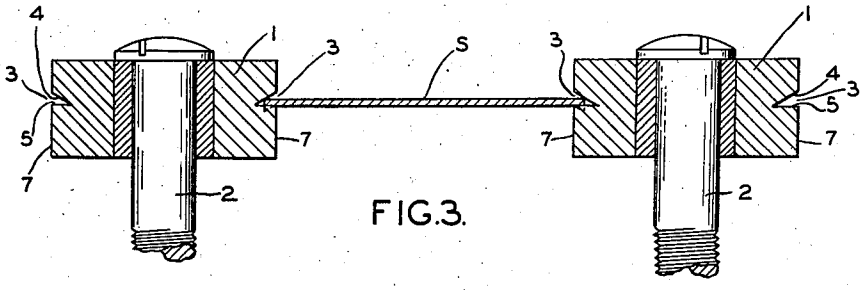



FIG. 3.

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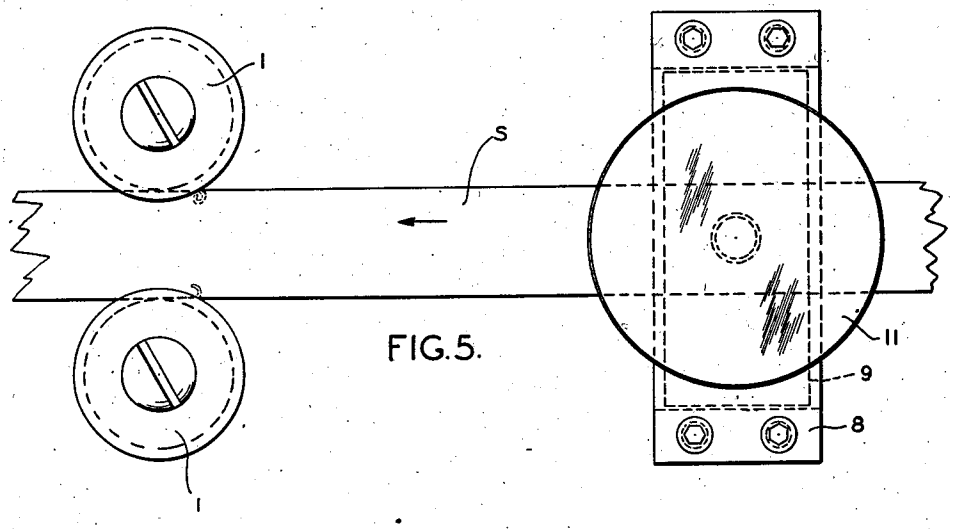



FIG.5.

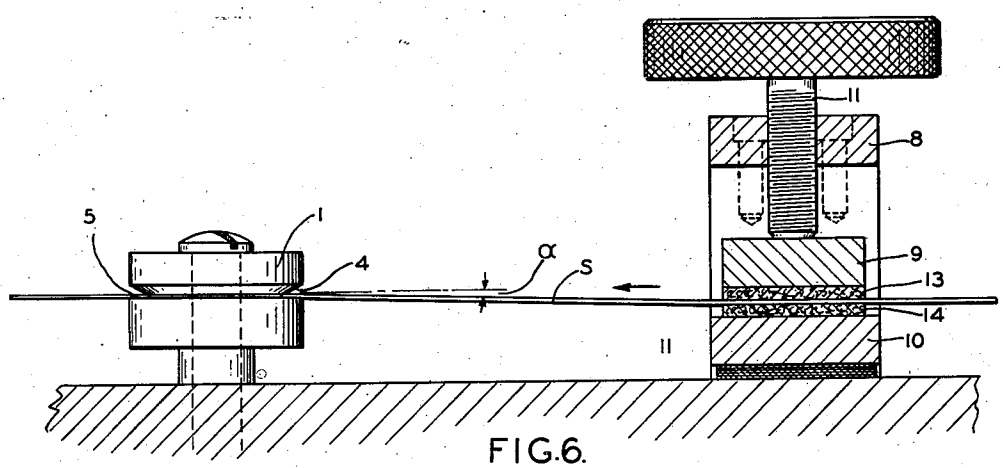



FIG.6.

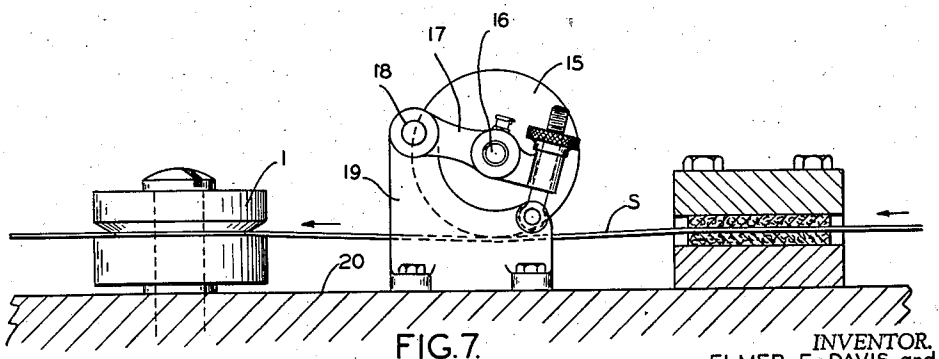



FIG.7.

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# UNITED STATES PATENT OFFICE

2,381,807

## METHOD OF AND MEANS FOR REMOVING BURR FROM STRIPS

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Application October 15, 1942, Serial No. 462,198

10 Claims. (Cl. 164—17)

This invention relates, as indicated, to a method of and means for removing burr from strip.

The cutting or slitting of sheet or strip metal by all methods heretofore employed results in the formation of a burr or raised edge adjacent the cut. In the production of metal strip, it is highly desirable that there be no burr.

Attempts to remove the burr have heretofore been devised, involving operations such as filing, grinding or rolling, each of which has proved objectionable, due to attendant faults affecting either the quality and uniformity of the removal of the burr or involving the economical production of the material.

It is a primary object of the present invention, accordingly, to provide a method of and means for economically removing burr from metal strip without altering the strip thickness adjacent the edge of the strip or in any way adversely affecting the condition of the strip by such removal.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a plan view, showing the method of removing the burr;

Fig. 2 is a cross-sectional view of the strip, taken on the line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view, on a slightly enlarged scale, taken on the line 3—3 of Fig. 1;

Fig. 4 is a cross-sectional view of the strip, taken on the line 4—4 of Fig. 1;

Fig. 5 is a view similar to Fig. 1, but showing a modified form of the method;

Fig. 6 is a cross-sectional view, taken on the line 6—6 of Fig. 5, and

Fig. 7 is a view similar to Fig. 6, but showing a still further modification of the method.

Referring more particularly to Figs. 1 to 4 of the drawings, wherein for the purpose of illustration, is shown a preferred embodiment of the invention, a pair of rolls 1, 1 is shown, these rolls being revolubly mounted on spindles 2.

Each of the rolls is provided at its peripheral surface with an annular recess 3, the recess being bounded at one side by a conical wall 4 and at the other side by a wall 5 in the form of surface of revolution formed by revolving a line extending from the inner edge of the surface 4 to the periphery of the roll, and at right angles to the axis of the roll, about the axis of the roll. For practical purposes, the wall 4 is at an angle of approximately 30 degrees to the wall 5, but this angle may be varied within reasonable limits.

For the purpose of removing the burr B from the strip S, the strip is passed through the rolls, as by pulling it in the direction indicated by the arrow in Fig. 1, with the side thereof which is free from burrs disposed against the walls 4 of the recesses 3, and the side thereof having the burrs B adjacent the walls 5 of these recesses. The rolls 1 are spaced from each other in such a manner that as the strip is pulled through the rolls in the manner described, the walls 4 of the recesses 3 force the strip towards the opposite walls 5, the flat lower surface of the strip S, as seen in Fig. 3, engaging the walls 5 as the strip engages the rolls. This results in a shearing off of the burrs B at the points 6 (Fig. 1) by the sharp edges formed by the intersection of the walls 5 of the recesses with the peripheral walls 7 of the rolls, with the result that the strip emerges from the rolls in the condition shown in Fig. 4, i. e., free from burrs.

It will be understood that the distance between the rolls must be properly adjusted to produce the desired shearing of the burrs, but at the same time, to avoid concaving of the strip, which might occur if the rolls were too closely spaced. During the aforesaid shearing or burr removing operations, the rolls will be rotated by the strip in the direction indicated by the arrows in Fig. 1.

If desired, the strip may be passed through a second set of rolls similar to the set which has been described, for the purpose of removing any vestiges of the burrs which were not removed by the first set, and for smoothing the strip at the points where the burrs were present.

It will be seen from the foregoing that the burr is removed in a neat and expeditious manner, and that the rotation of the rolls results in constantly presenting new shearing edges to the strip, so that such wear of the rolls as occurs, is uniformly distributed about the rolls.

In the practice of the foregoing method, it is desired to point out that it is essential that the edges formed by the intersection of the walls 5 of the recesses with the peripheral walls 7 of the rolls be constantly maintained in a keenly sharp condition. This can be accomplished by sharpening such edges by taking a straight grinding cut off the peripheral walls 7 of the rolls. This grinding can be repeated until the width of the annular recess has been decreased to a point approaching the gauge thickness of the material from which the burr is to be removed, at which point the recess will no longer serve as a guide for the strip. At such time the annular recess can again be produced until subsequent grindings eventually reduce the rolls to a minimum

diameter, below which it would be impractical to go.

It is also highly desirable, in the practice of the foregoing method, that the strip be adjustably supported and held taut so as to be accurately guided into the burr shearing rolls. A misalignment of the strip with the rolls will cause either the failure of the rolls to shear the burr, or, conversely, the removal of too much burr. This may be accomplished by the means shown in Figs. 5 and 6.

Referring to Figs. 5 and 6, it will be seen that the strip S, before proceeding to the burr removing rolls 1, is passed through a clamping device comprising a holder 8, a clamping bar 9, a clamp bar 10, a clamp screw 11, threadedly mounted in the holder 8, and adjustable to vary the location of the clamping bar. The clamp base 10 may also be vertically adjusted, as by means of shims 12, or by a micrometer screw (not shown). For the protection of the strip, as well as to equalize the pressure of the clamping bar and clamping base over the surfaces of the strip, pads 13 and 14, of felt or the like, are interposed between those elements and the strip.

The clamping bar and clamp base are so adjusted as to create back tension in the strip so as to maintain the strip in a taut condition while being fed into the burr removing rolls. This adjustment is also preferably such as to cause the strip to enter the rolls at a slight angle $\alpha$, to the plane of the walls 5 of the rolls. In operation, this angle is very slight, while the shearing edges are sharp. As the shearing edges become dull, the angle $\alpha$ must be increased, so as to create a more forceful shearing action. In practice, the compression of the lower pad 14, permits as much increase in the angle $\alpha$ as is required.

Since, in the foregoing arrangement, the angle $\alpha$ can be increased only by squeezing the pad 14, and since this might result in the creation of more tension in the strip than is necessary, it may be desirable, under certain conditions, to employ the arrangement shown in Fig. 7. In this arrangement, the strip is passed through a clamping device similar to that shown in Fig. 6, but before passing to the burr removing rolls 1, the strip is passed under a roller 15, mounted on a shaft 16, supported in a bracket or bearing 17, which is pivotally mounted, as at 18, on a support 19, secured to the base 20. By adjusting the position of the roller 15, by means of the adjusting means shown, the angle at which the strip enters the burr removing rolls may be adjusted as desired, and without adjustment of the clamping device.

It is to be understood that the invention is designed to be included with other operations, as the strip is being uncoiled and coiled for said operations. For example, metal strip, upon leaving slitting or ripping operations, generally has a concaved section imparted by these operations. A flattening operation is generally necessary, involving the stretching and/or flexing of the strip during an unwinding and winding operation. During this operation, the burr removal rolls could be mounted in receiving relation to the flattening apparatus, and, during the same pass, the burr could be removed without additional handling of the strip.

It is to be also understood that the forms of our invention, herewith shown and described, are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of our invention, or the scope of the subjoined claims.

Having thus described our invention, we claim:

1. The method of removing burr from a strip which consists in passing the strip through rolls having shearing edges adjacent the periphery of the rolls, and causing said strip to bear with sufficient pressure against said edges to cause said edges to shear the burr from the strip.

2. The method of removing burr from a strip which consists in passing the strip through rolls having shearing edges formed at the intersection of the peripheral surfaces of the rolls with surfaces extending inwardly of the rolls, and causing said strip to bear with sufficient pressure against said edges to cause said edges to shear the burr from the strip.

3. The method of removing a burr from a strip which consists in passing the burred edge of the strip through a recess formed by two surfaces inclined to each other, and causing the burred edge of the strip to bear with sufficient pressure against one of said surfaces to cause the edge of said surface to shear the burr from the edge of the strip.

4. The method of removing a burr from the edge of a strip, which consists in forcing the strip against a revoluble shearing edge with sufficient pressure to cause said edge to shear the burr from the strip.

5. The method of removing burr from a strip which consists in passing the strip through rolls having shearing edges formed at the intersection of the peripheral surface of the rolls with surfaces extending inwardly of the rolls, the strip being passed through said rolls at a slight angle to said last-named surfaces.

6. The method of removing burr from a strip which consists in passing the strip through rolls having shearing edges adjacent the periphery of the rolls, and applying back tension to said strip while passing through said rolls.

7. Means of the character described, comprising burr removing rolls and means for applying a back tension to strip passed through said rolls.

8. Means of the character described comprising burr shearing rolls, and means for causing strip to enter said rolls at a slight angle to a plane normal to the plane which includes the axes of said rolls.

9. The method of removing burrs from the edges of a strip, said method consisting in passing said edges over the intersections of shearing surfaces of rolls which are so disposed as to guide and support the strip edges, and controlling such passage in such a manner as to cause said intersections to apply a shearing action against those portions of the burred edges which extend beyond the body of the strip, thereby removing said portions without altering the desired cross-section of the strip.

10. The method of removing burrs from the edges of a strip, said method consisting in passing said edges over the intersections of shearing surfaces of undriven rolls which are so disposed as to guide and support the strip edges, and controlling such passage in such a manner as to cause said intersections to apply a shearing action against those portions of the burred edges which extend beyond the body of the strip, thereby removing said portions without altering the desired cross-section of the strip.

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