Nov. 17, 1925. 1,561,803

H. C. SMITH

STRIP STRAIGHTENING ATTACHMENT FOR ROTARY SHEARS

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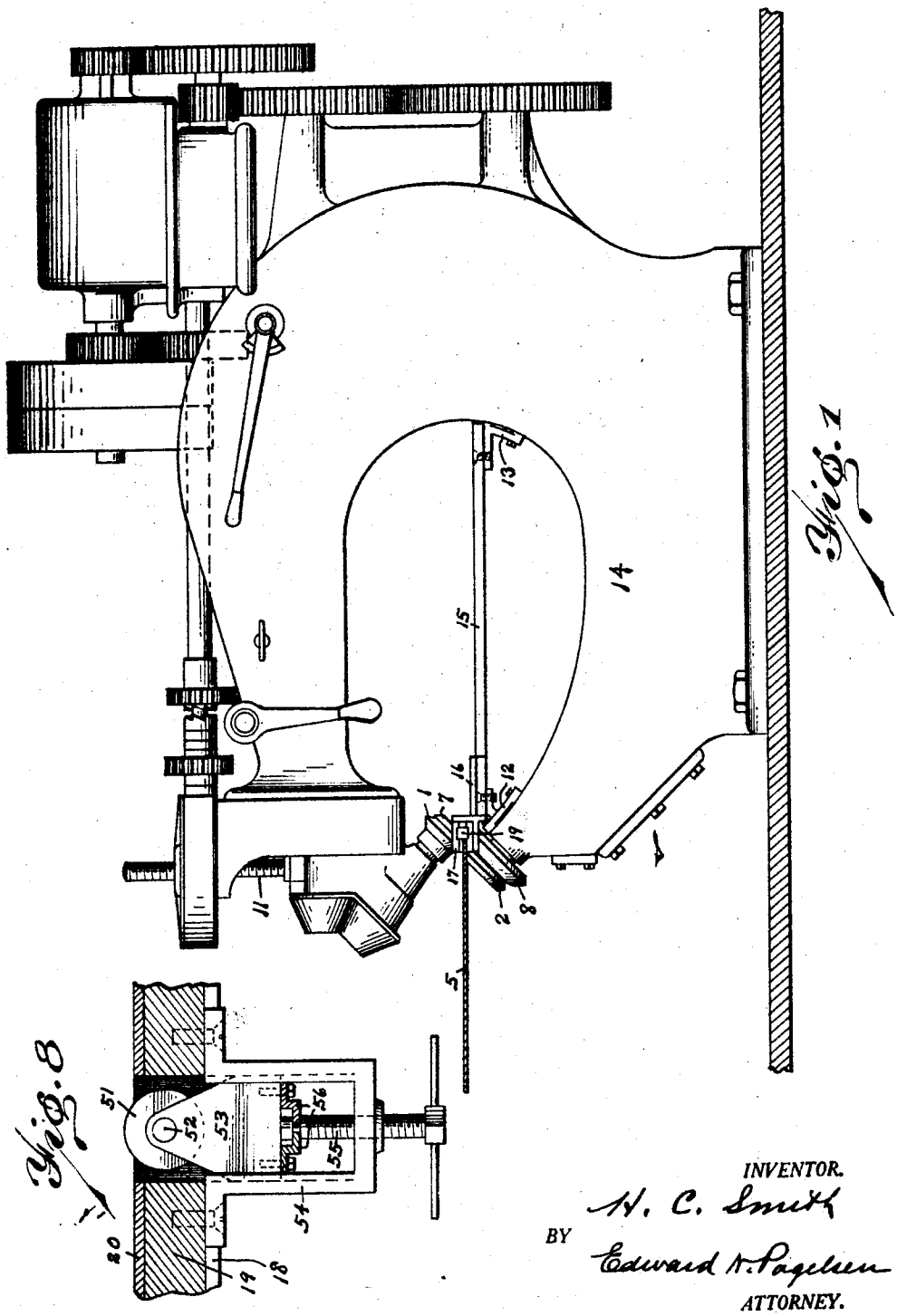


Fig. 1

Fig. 8

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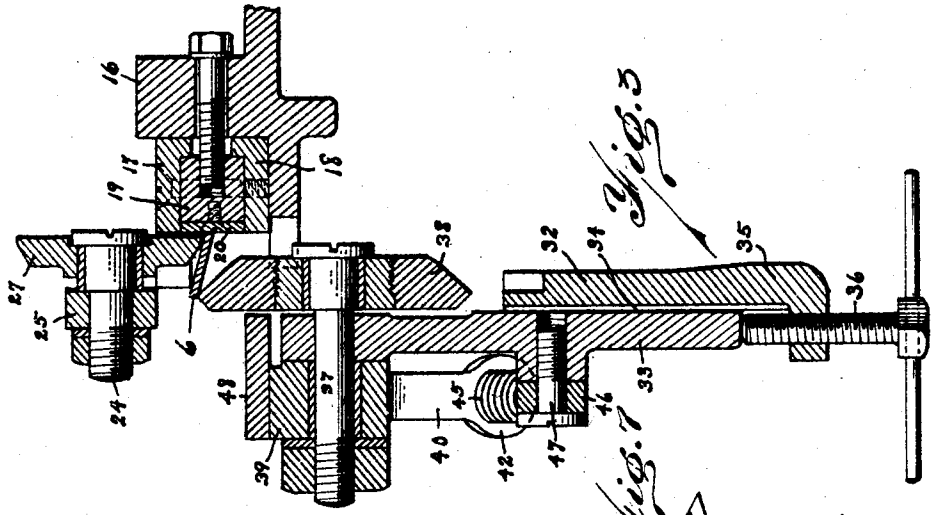


Fig. 3

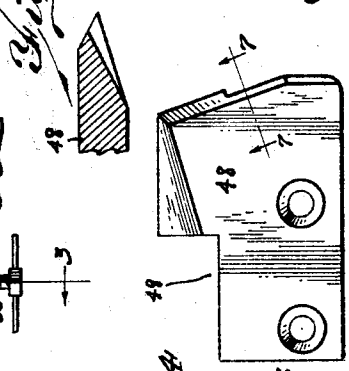


Fig. 6

Fig. 7

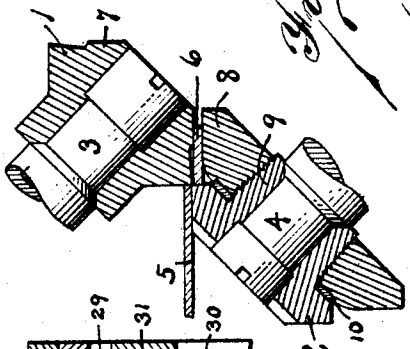


Fig. 4

Fig. 2

Fig. 5

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UNITED STATES PATENT OFFICE.

HENRY COLLIER SMITH, OF ST. MARYS, OHIO.

STRIP-STRAIGHTENING ATTACHMENT FOR ROTARY SHEARS.

Application filed December 7, 1921. Serial No. 520,541.

To all whom it may concern:

Be it known that I, HENRY COLLIER SMITH, a citizen of the United States, and residing at St. Marys, in the county of Auglaize and State of Ohio, have invented a new and Improved Strip-Straightening Attachment for Rotary Shears, of which the following is a specification.

This invention relates to means for straightening and flattening strips cut from sheets by rotary shears or cutters, and its object is to provide a simple and easily adjusted mechanism which can be readily attached to or detached from the frame of the shears.

This invention consists of a pair of rollers attached to rotary cutters for the purpose of lengthening the outer edge of the strip being severed from a sheet, the inner edge of the sheet being stretched by means of the cutters in making the cut, and for the further purpose of feeding the rear end of the strip entirely through the cutters.

It further consists in a pair of rollers adapted to engage the severed strip and twist it contrary to the curl imparted to it during the shearing operation in order to remove the curl and thus flatten the strip.

It also consists in adjustable mountings for the straightening rollers to provide for variations in the amount of curl in the strips as they leave the cutters.

It also consists in an adjustable guide for one edge of the sheet being slitted and of the severed strip in order to straighten the strip edgewise and to properly position it between the twisted rolls.

It also consists in the details of construction illustrated in the accompanying drawings and particularly pointed out in the claims.

In the drawings, Fig. 1 is a side elevation of a rotary shear provided with my novel straightening mechanism. Fig. 2 is a front elevation of the straightening mechanism. Fig. 3 is a section on the line 3—3 of Fig. 2. Fig. 4 is a longitudinal section of the conical cutting rolls. Fig. 5 is a section on the line 5—5 of Fig. 2. Fig. 6 is a plan of a guide plate. Fig. 7 is a section on the line 7—7 of Fig. 6. Fig. 8 is a plan of a guide for severed strips.

Similar reference characters refer to like parts throughout the several views.

The rotary shear shown in Fig. 1 is of well known design and is equipped with rotary cutters 1 and 2 of substantially the same size, mounted on the substantially parallel shafts 3 and 4 respectively which extend in opposite directions. The sheet 5 to be slitted is passed between these cutters and a strip 6 is severed therefrom in the usual manner. In Fig. 4 these cutters are shown in operative position and the upper conical cutter 1 is shown provided with a conical extension 7 while a conical roll 8 is mounted on the hub 9 of the conical cutter 2. Rotary cutters of this character are usually made with their cutting edges of the same diameter in order to reduce friction and heating. The feed roll 8 is therefore larger than the roll 7. A spacing washer 10 of hard metal determines the exact vertical distance between the top of the cutter 2 and the roll 8. The pressure placed on the strip 6 as it is being severed from the sheet is determined by the screw 11 which provides the vertical adjustment of the upper cutter 1.

When a strip is severed by means of rotary cutters from any ductile material, the inner edge thereof is stretched and bent by the shearing process, causing the strip to become curved edgewise and helical in shape. This may be in part obviated by the feed rolls 7 and 8 which engage the outer edge of the severed strip and may stretch it to some extent. In all rotary shears, the line of shear is seldom at the plane passing through the axes of the cutters, but is usually at one side of this plane, the distance depending on the lap of the cutters and the thickness of the sheet being sheared. During the cutting, the sheet is fed along by the cutters, but when a strip is severed, the strip and sheet stop. In the present case, the rolls 7 and 8 force the severed strip along beyond this common plane of the cutters.

The curve or twist is not usually removed or prevented by the rolls 7 and 8 and straightening rollers are therefore provided. Brackets 12 and 13 are secured to the frame 14 of the shear and a bar 15 is carried thereby. A supporting plate 16 is adjustably mounted on this bar and a guide bar is carried by this plate. This guide bar is preferably formed of an upper member 17, a lower member 18, a central member 19 and bearing plates 20, the last preferably of hard steel. Any desired means may be employed to unite the parts of this guide bar and the supporting plate. The lower member 18 of

this guide bar extends forward on the feed side of the cutters and supports the sheet being slitted up to the rotary cutters, the edge of the sheet being guided by an adjacent plate 20. Beyond the cutters this member 18 is preferably flush with the bottom edge of the plate 20.

Mounted on the guide bar is a base 22 which has a small boss 23 which carries a pin 24 on which a lever 25 is mounted. This lever carries a pin 26 at its inner end on which the twisting or straightening roller 27 is mounted and a pin 28 is journaled in its outer end. A bracket 29 on this base 22 carries a screw 30 which turns in the threaded rear end 31 of this pin 28. By turning the screw 30, the roller 27 is moved up or down.

A plate 32 is attached to the frame 14 and a bar 33 is slidable in a dove-tail groove 34 therein. An arm 35 carries a screw 36 by means of which this bar is supported. The upper end of this bar carries a pin 37 on which is mounted the lower twisting or straightening roller 38 which co-acts with the roller 27 to untwist the strips as they are severed from the sheet 5. Mounted on this pin 37 is a head 39 which has an arm 40 which has an eye 42 at its outer end in which the stem 43 is slidable. A wing nut 44 holds this arm against the spring 45 and an eye 46 at the inner end of this stem is mounted on the pin 47 carried by the bar 33.

It is evident that the members 27 and 38 are not necessarily rotatable, as they would accomplish the same purpose if they were rigid, but the friction is greatly reduced by having them rotatable. Neither is it necessary for these rollers to have beveled faces.

Mounted on the head 39 is a guide plate 48 which has a beveled edge toward the cutter 2 and which can be tipped down to receive the severed strip as it leaves the cutting rolls, this plate having a notch 49 to admit the roller 38. By properly positioning this guide plate and the two rollers 27 and 37, any twists in the severed strips may be entirely eliminated.

The strip as it leaves the cutters and the twisting rollers may have a permanent curve edgewise which may be removed by means of a roller 51 extending through the guide plate 20 and carried by a pin 52 in a slide block 53 mounted in the bracket 54, as shown in Fig. 8. A screw 55 mounted in this bracket is connected to the block 53 by means of small clips 56, if desired. The roller 51 being adjustable in and out pushes the strip 6 in to a greater or less extent and bends it in its own plane to straighten it. This member 51 may again be non-rotatable, but in such case the friction would be greater.

The operation of the straightening mechanism is apparent from the foregoing description. By this construction sheets or strips of any desired material and of any size may be passed through between the cutters and slitted to produce flat and straight strips of even width. This is particularly valuable when long ribbons of ductile metal are to be slitted into narrower ribbons. It is apparent that this sheet guide and strip straightening attachment may be used with any other type of rotary shear and may be adapted to such other types by skilled engineers.

The details and proportions of the several parts of this straightening mechanism may all be changed by those skilled in the art without departing from the spirit of my invention as set forth in the following claims.

I claim:—

1. In combination with a shear provided with a pair of conical rotary cutters, and conical rolls co-axial with said cutters to grip severed strips between them.

2. In combination with a shear provided with a pair of conical rotary cutters, and conical rolls co-axial with said cutters to grip severed strips between them, one of the rolls being of greater diameter than the other.

3. In combination with a rotary shear provided with substantially parallel shafts extending in opposite directions and conical rotary cutters on the adjacent ends thereof, and conical feed rolls co-axial with said cutters to grip severed strips between them, one of the rolls being at the outer end of one cutter and the other at the inner end of the other cutter.

4. In combination with a shear provided with a pair of rotary cutters and shafts therefor, a pair of straightening rollers having beveled faces adapted to engage and twist severed strips as they leave the cutters, and parallel shafts for said straightening rollers.

5. In combination with a shear provided with a pair of rotary cutters, a pair of straightening rollers adapted to engage severed strips after they leave the cutters, parallel shafts on which the rollers are mounted, the faces of the rollers being beveled and adapted to twist the strips, and means to adjust the rollers relative to each other.

6. In combination with a shear having rotary cutters, a guide plate to receive severed strips, and a pair of straightening rollers adapted to engage the strips as they leave the guide plate and twist them the axes of the straightening rollers being at an angle to the axes of the rotary cutters.

7. In combination with a shear having rotary cutters, a guide bar extending at right angles to the axes of the cutters and adapted to support and guide a sheet to the cutters, a pair of feed rolls adapted to engage the strips as they are severed by the cut-

ters, and a pair of straightening rollers adapted to twist the severed strips.

8. In combination with a shear having rotary cutters, a guide bar extending at right angles to the axes of the cutters and adapted to support and guide a sheet to the cutters, a pair of feed rolls adapted to engage the strips as they are severed by the cutters, a pair of straightening rollers adapted to twist the severed strips, and an adjustable guide plaate for the strips between the feed rolls and straightening rollers.

9. In combination with a shear having rotary cutters, a pivotally mounted plate adapted to receive the severed strips from the cutters, means to swing the plate, a pair of straightening rollers adapted to engage the strips as they leave said plate to twist them, and means to move the guide plate toward and from one of said rollers.

10. In combination with a shear having rotary cutters, a pivotally mounted plate adapted to receive the severed strips from the cutters, means to swing the plate, a pair of straightening rollers adapted to engage the strips as they leave said plate to twist them, and means to move the guide plate toward and from one of said rollers, said plate being pivoted on the axis of the lower straightening roller.

11. In combination with a shear having rotary cutters, a pivotally mounted plate adapted to receive the severed strips from the cutters, means to swing the plate, a pair of straightening rollers adapted to engage the strips as they leave said plate to twist them, means to move the guide plate toward and from one of said rollers, a support for the other roller, and means to move the upper roller toward and from the guide plate.

12. In combination with a shear having rotary cutters, a pivotally mounted plate adapted to receive the severed strips from the cutters, means to swing the plate, a pair of straightening rollers adapted to engage the strips as they leave said plate to twist them, means to move the guide plate toward and from one of said rollers, a guide bar for the sheets from which the strips are to be severed, a lever mounted on the guide bar and having one of the straightening rollers mounted at one end, and means to swing said roller.

13. In combination with a shear having rotary cutters, a guide bar extending at right angles to the axes of the cutters and adapted to support and guide a sheet to the cutters, a pair of feed rolls adapted to engage the strips as they are severed by the cutters, a pair of straightening rollers adapted to twist the severed strips, and a guide roller adapted to engage the outer edges of the severed strips.

14. In combination with a shear having rotary cutters, a guide bar extending at right angles to the axes of the cutters and adapted to support and guide a sheet to the cutters, a pair of feed rolls adapted to engage the strips as they are severed by the cutters, a pair of straightening rollers adapted to twist the severed strips, a guide roller adapted to engage the outer edges of the severed strips, and means to adjustably support the guide roller.

15. In combination with a shear having rotary cutters, the combination of a guide bar adapted to support and guide a sheet to be slitted, a pair of rolls co-axial with the cutters adapted to feed severed strips from the cutters, a guide plate adapted to receive the severed strips, a pivot on which the plate is mounted, means to move the pivot up and down, means to swing the plate on the pivot, a straightening roller mounted on said pivot, a lever mounted on the guide bar, a second roller mounted on the lever opposite the first named roller, means to adjust the lever, the faces of the rollers being beveled to twist the strips, and a roller movable at right angles to the straightening rollers adapted to engage one edge of the severed strip to bend it edgewise.

16. In combination with a shear provided with rotary cutters to slit a sheet of metal and support it in a predetermined plane, a pair of rotary straightening members having their axes spaced apart from the axes of the cutters and adapted to engage severed strips in a different plane from that of the sheet as said strips leave the cutters.

17. In combination with a shear provided with rotary cutters to slit a sheet of metal and support it in a predetermined plane, a pair of rotary straightening members having their axes spaced apart from the axes of the cutters and adapted to engage severed strips in a different plane from that of the sheet as said strips leave the cutters, and means to adjust said straightening member relative to said first named plane.

18. In combination with a shear having rotary cutters adapted to produce strips of metal, and an adjustable member spaced a distance from the cutters adapted to engage two edges of each of the severed strips to straighten them.

19. In a metal cutting shear, the combination of rotary cutters for slitting sheets into strips, means to guide the sheets along straight lines and curl removing means operated by the cutters through the medium of the strips which are being cut.

20. A metal cutting shear having rotary cutters for slitting sheets into strips, means to guide the sheets along straight lines and curl removing means and strip straightening means operated by the cutters through the medium of the strip which is being flattened and straightened.

HENRY COLLIER SMITH.