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M. MORGAN
ROTARY SHEARS

2,504,035

Filed Dec. 14, 1948

2 Sheets-Sheet 1

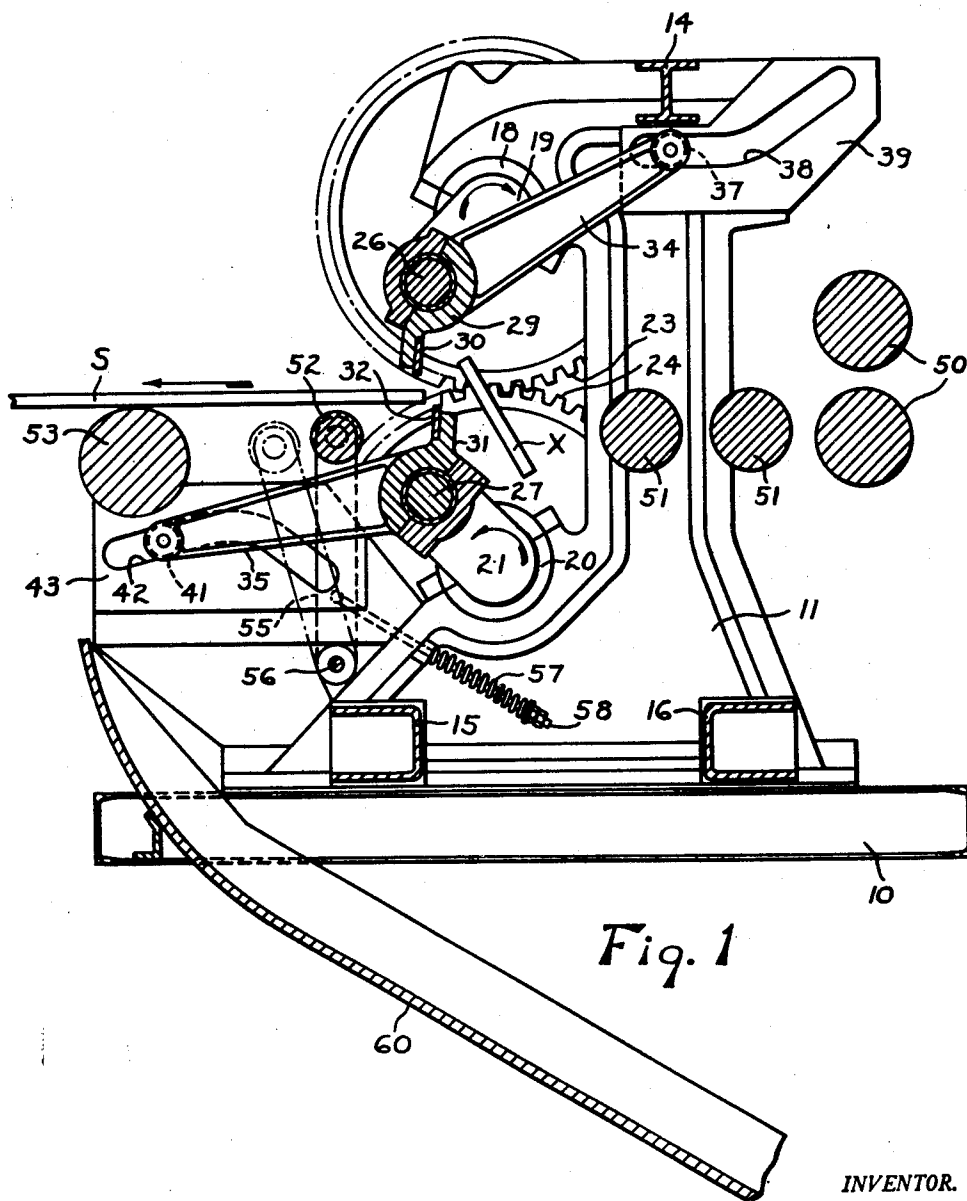


Fig. 1

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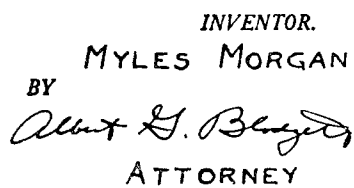


Fig. 2

UNITED STATES PATENT OFFICE

2,504,035

ROTARY SHEARS

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2 Claims. (Cl. 164—68)

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This invention relates to rotary shears, and more particularly to shears of the type used for cutting longitudinally traveling metal bars or the like into predetermined lengths.

One mechanism which is particularly adapted for this purpose is disclosed in the patent to Morgan et al. No. 2,157,000. This prior mechanism comprises a pair of crankshafts located one above the other and rotated in unison by a source of power. Each crankshaft has the usual crank portion on which a hub structure is pivotally mounted to form a support for a shear blade. An arm projects from each hub structure, and the end of each arm is guided by a fixed cam in such a way as to maintain the desired parallel relationship between the two shear blades during the cutting portion of each cycle.

When pieces of a predetermined length are cut successively from the front end of a long metal bar of random length, an odd length piece will eventually be left at the tail end of the bar. This piece may be of any length from a very short piece to one which is nearly as long as those previously cut. If the final piece is long enough to travel through the shear behind the previously severed piece, no difficulty will be encountered. Furthermore, if the final piece is very short, it will usually drop clear of the various moving parts. However, if the final piece is of appreciable length and yet not quite long enough to continue its course of travel through the shear, it may fall in such a manner as to become entangled in certain moving parts of the shear and cause damage thereto.

It is accordingly one object of the invention to provide a rotary shear so constructed as to minimize the possibility of damage from an odd length piece left at the rear end of a severed bar.

It is a further object of the invention to provide a rotary shear having a pair of cooperating blades which are held in correct parallel relationship during each cut, the construction being such as to provide a free path through which an odd length piece at the rear end of a severed bar may fall without becoming entangled with moving parts.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

Referring to the drawings illustrating one embodiment of the invention and in which like reference numerals indicate like parts,

Fig. 1 is a vertical longitudinal section through

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a rotary shear, the section being taken on the line 1—1 of Fig. 2; and

Fig. 2 is an elevation of the shear as viewed from the rear or discharge end thereof, certain parts being omitted or broken away for clearness of illustration.

The embodiment illustrated comprises a hollow rectangular base member 10 forming a support for two spaced upright side members 11 and 12, which are connected at the top by a horizontal bridge member 14 and at the bottom by two spaced horizontal bridge members 15 and 16. The side members 11 and 12 provide suitable bearings 18, 18 for an upper crankshaft 19, and suitable bearings 20, 20 for a lower crankshaft 21. These crankshafts have secured thereon intermeshing gears 23, 24 respectively so that they may be rotated in unison by any suitable source of power, not shown. The directions of rotation are indicated by the arrows in Fig. 1, with the stock S traveling from the right to the left. The crankshafts 19 and 21 have cranks 26 and 27 respectively formed thereon between the journaled portions of the shafts and so related angularly that the upper crank 26 will reach its lowermost position at substantially the same time as the lower crank 27 reaches its uppermost position, thereby producing a cutting position of the crank carried shear blades subsequently described. The upper crank 26 provides a pivotal support for an encircling two-part hub structure 29 to which a shear blade 30 is fixed, and the lower crank 27 similarly provides a pivotal support for an encircling two-part hub structure 31 to which a shear blade 32 is fixed. The upright surfaces of these blades which contain the cutting edges thereof are arranged to overlap at each cutting position, and these surfaces are substantially radial with respect to the axes of the corresponding cranks.

To obtain a proper shearing action it is important that from the time the shear blades first engage the stock until the stock has been severed, the blades be supported in the proper parallel relationship with one another and perpendicular to the stock. For this purpose the upper hub structure 29 is provided with an arm 34 which extends forwardly toward the front end of the shear, and the lower hub structure 31 is provided with an arm 35 which extends rearwardly toward the rear end of the shear. The upper arm 34 carries a roller 37 which engages a guide slot 38 formed in an upright plate 39 mounted on the side member 11 in a position in front of the upper crankshaft 19. The lower arm 35 carries a roller

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41 which engages a guide slot 42 formed in an upright plate 43 mounted on the side member 11 in a position behind the lower crankshaft 21. The slots 38 and 42 are so shaped as to bring about the desired parallel relationship between the blades at the time of cut, as more fully explained in the above-mentioned patent to Morgan et al. No. 2,157,000.

Any suitable means may be provided to support and feed stock through the shear. As shown, a pair of pinch rolls 50 is mounted in front of the shear, and two conveyor rolls 51 are mounted behind the pinch rolls but in front of the crankshafts. A conveyor roll 52 is located behind the crankshafts, and a conveyor roll 53 is located behind the roll 52. All of these rolls are preferably driven in known manner by suitable means (not shown). The roll 52 is yieldable in the general direction of stock travel, and for this purpose it is mounted on the upper ends of two upright arms 55 which are connected at their lower ends by a horizontal shaft 56 journaled in the frame side members 11—12. A spring 57 is connected to one of the arms 55 by means of a rod 58 in such a manner that the roll 52 will normally remain in the position shown in full lines in Fig. 1, but it may move to the broken line position if struck by the front end of an on-coming bar. An inclined crop chute 60 is supported by the base 10 in position to receive severed pieces of stock which are too short to continue beyond the roll 53.

The operation of the invention will now be apparent from the above disclosure. A long metal bar or the like will travel from a suitable source (such as a billet rolling mill) to the pinch rolls 50 and over the rolls 51. The shear crankshafts 19—21 will be rotated in a known manner in timed relationship with the arrival of the bar, as disclosed for example in the prior patent to Murrah No. 2,425,484, so that the blades 30—32 will cut a short piece or "crop," say a few inches long, from the front end of the bar. This crop will drop behind the lower crank 27 and into the chute 60, along which it will slide to a place of disposal. The main bar S will continue over the rolls 52 and 53, and at regular intervals the blades 30—32 will meet to sever the bar into desired lengths of say thirty feet. During each cut the slots 38—42 will guide the rollers 37—41 in such a manner as to maintain the blades perpendicular to the bar, so that clear and accurate cuts may be made. At the completion of the final cut on the bar a piece of odd length will remain at the tail end of the bar. This piece may be very short or it may be nearly as long as the standard lengths previously cut from the bar. If this piece is relatively long, it will travel over the rollers 52 and 53 in the same manner as the standard lengths. However, if the final piece is considerably shorter than the standard length, its tail end may leave the rear roll 51 before its front end has passed far enough over the roll 52 for the piece to continue in the normal path of travel. In that event the final piece will drop in front of the lower crank 27 to land in the chute

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60, and its fall will be substantially unimpeded, since the lower blade-control arm 35 is behind the shear crank 27. In Fig. 1 the shear has made its last cut on the stock S, and the final piece X has started to fall. This particular piece shown is comparatively short and has accordingly begun to fall without its front end having ever reached the roll 52. Since the rear roll 51 and the roll 52 must be located far enough apart to clear the path of the lower blade 32, it will be apparent that final pieces considerably longer than the piece X as illustrated will drop in front of the shear crank and into the chute. Upon completion of the final cut on a particular bar, the shear cranks will be brought to rest in positions approximately 180 degrees beyond their cutting positions, as fully described in the above mentioned patent to Murrah No. 2,425,484. Hence, if the falling final piece does strike the lower hub structure 31, it will merely glance off the same and drop into the chute 60, since by that time the cranks will be either moving very slowly or already stopped.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A rotary shear for cutting metal bars or the like into predetermined lengths as they travel longitudinally in a substantially horizontal direction comprising two rotatable cranks positioned respectively above and below the path of the bars, a hub structure pivotally mounted on each crank, a shear blade mounted on each hub structure, a fixed guide in front of the upper crank, means extending forwardly from the upper hub structure for engagement with the guide, a fixed guide behind the lower crank, and means extending rearwardly from the lower hub structure for engagement with the last mentioned guide, the said guides being constructed to position and hold the blades in substantially parallel relation as they engage the bar and sever the same.

2. A rotary shear for cutting metal bars or the like into predetermined lengths as they travel longitudinally in a substantially horizontal direction comprising two rotatable cranks positioned respectively above and below the path of the bars, a hub structure pivotally mounted on each crank, a shear blade mounted on each hub structure, a fixed upright plate in front of the upper crank and having a guide slot therein, an arm extending forwardly from the upper hub structure, a roller mounted on the arm and engaging the guide slot, a fixed upright plate behind the lower crank and having a guide slot therein, an arm extending rearwardly from the lower hub structure, and a roller mounted on the last mentioned arm and engaging the last mentioned guide slot, the said guide slots being shaped to position and hold the blades in substantially parallel relation as they engage the bar and sever the same.

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No references cited.