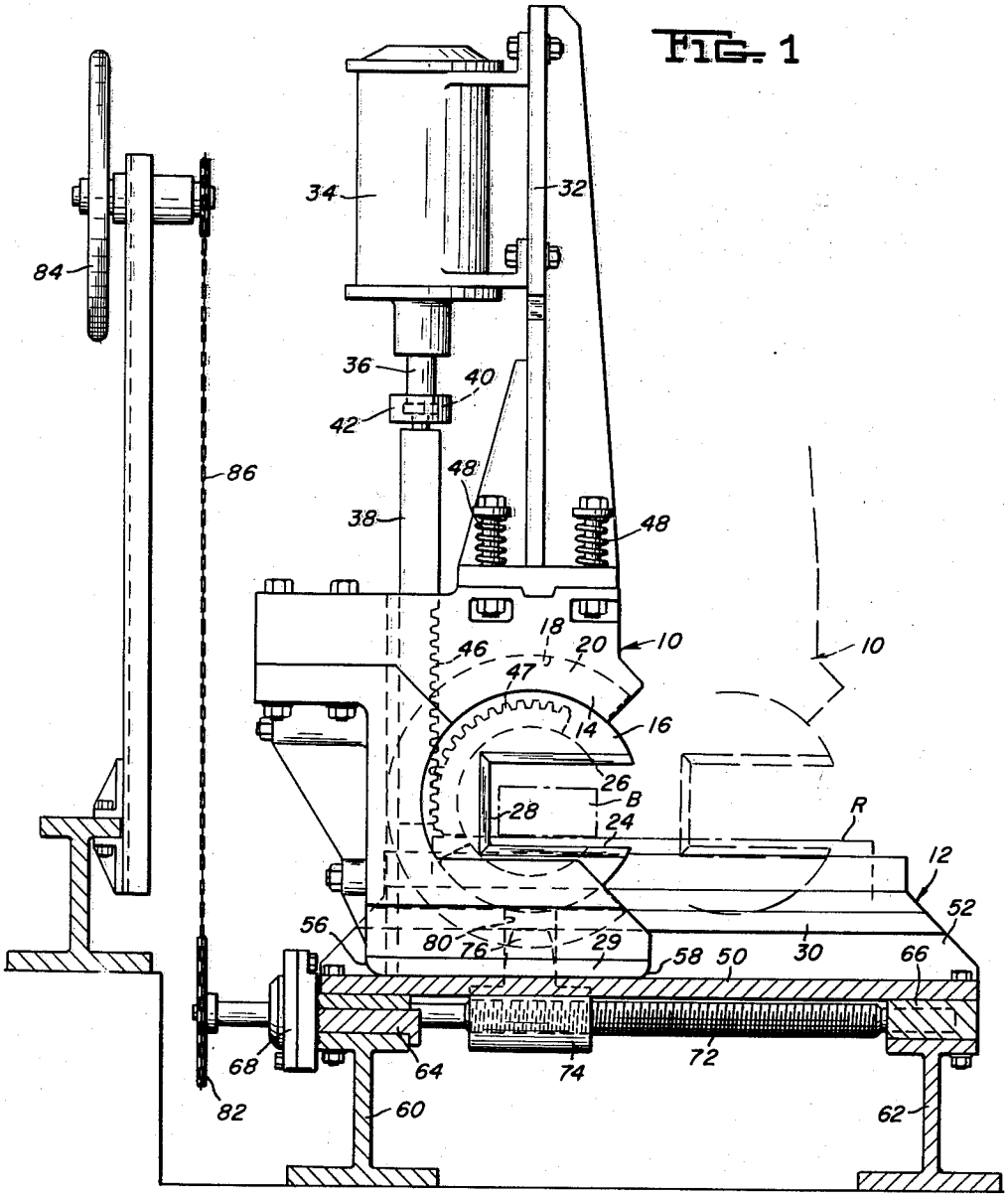
Nov. 10, 1964 A. W. JOHNSON 3,156,138

BAR TURNER

Filed Aug. 21, 1962 4 Sheets-Sheet 1

FIG. 1



INVENTOR
ARTHUR W. JOHNSON
By Donald G. Dalton
Attorney

Nov. 10, 1964 A. W. JOHNSON 3,156,138

BAR TURNER

Filed Aug. 21, 1962 4 Sheets-Sheet 2

FIG. 2

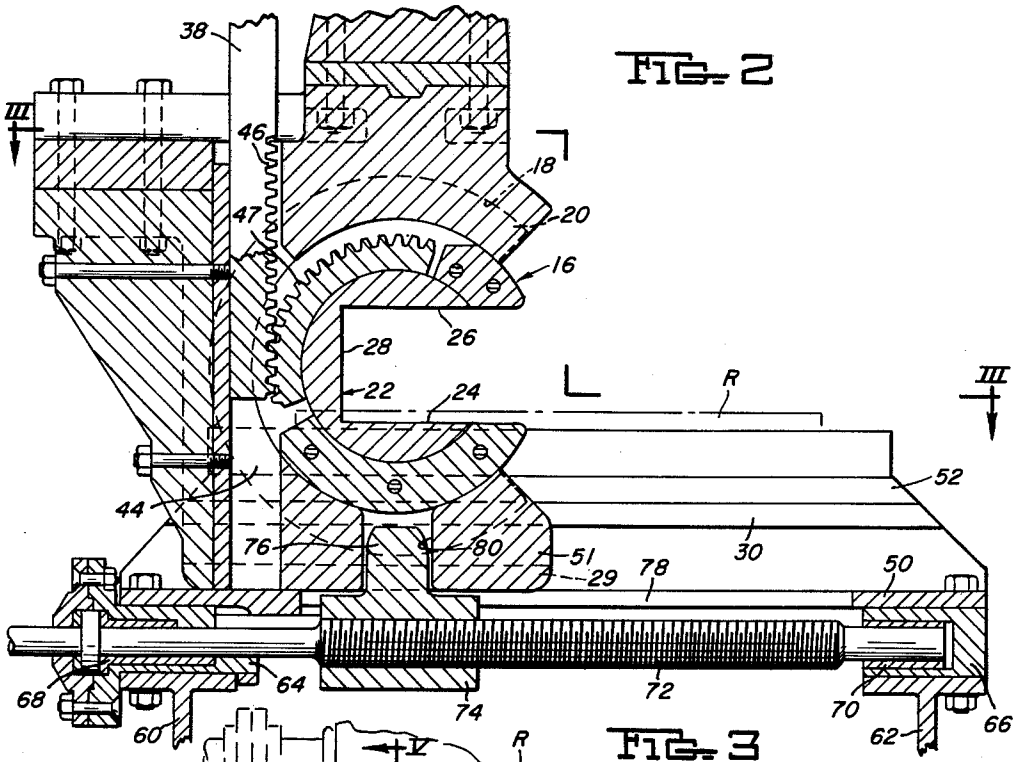
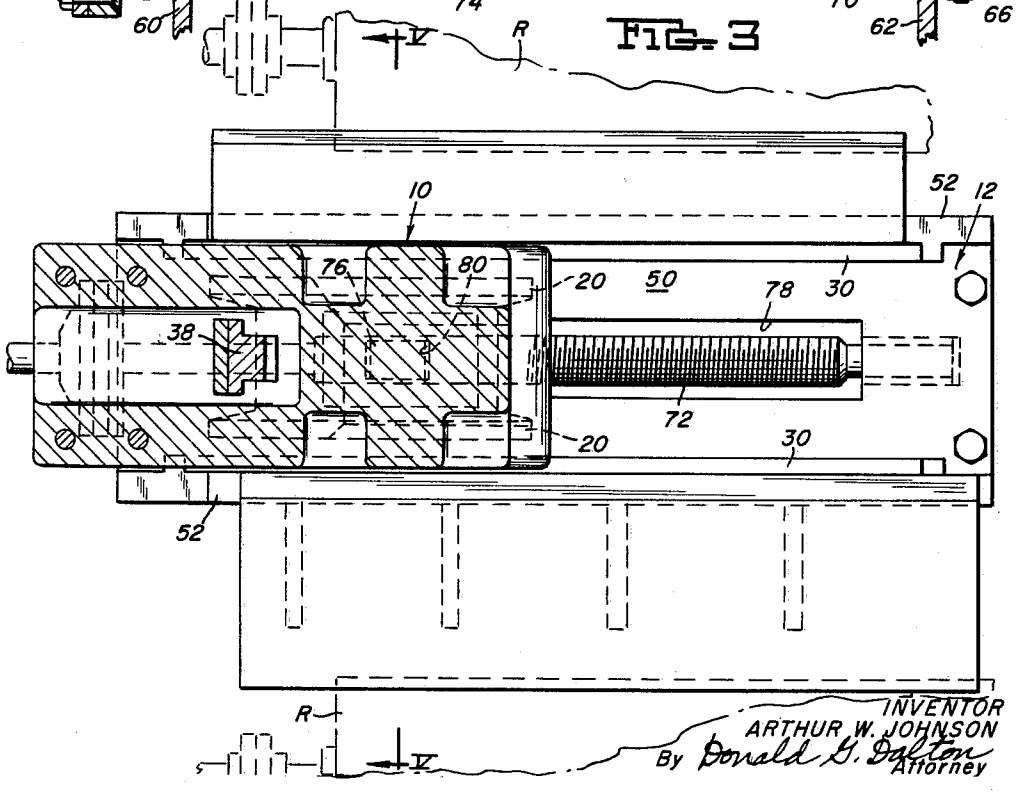


FIG. 3



INVENTOR
ARTHUR W. JOHNSON
By Donald G. Dalton
Attorney

Nov. 10, 1964 A. W. JOHNSON 3,156,138

BAR TURNER

Filed Aug. 21, 1962 4 Sheets-Sheet 3

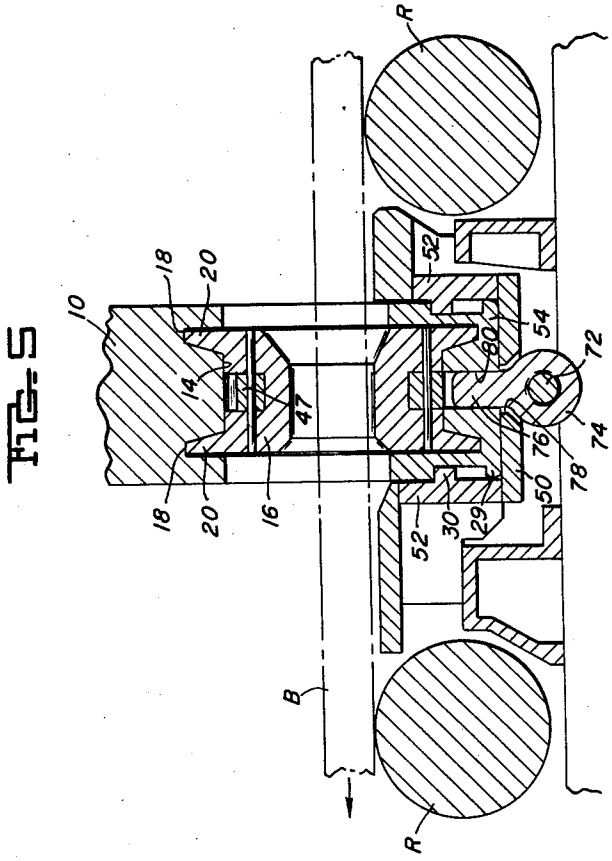


FIG. 5

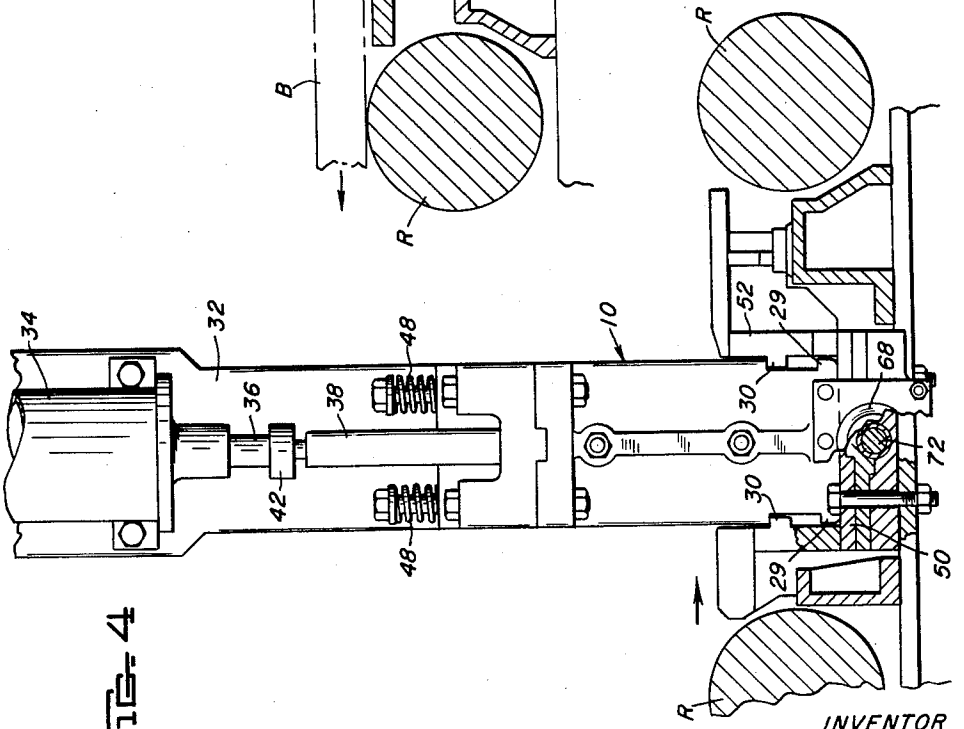


FIG. 4

INVENTOR
ARTHUR W. JOHNSON
By Donald G. Dalton
Attorney

Nov. 10, 1964 A. W. JOHNSON 3,156,138

BAR TURNER

Filed Aug. 21, 1962 4 Sheets-Sheet 4

FIG. 6

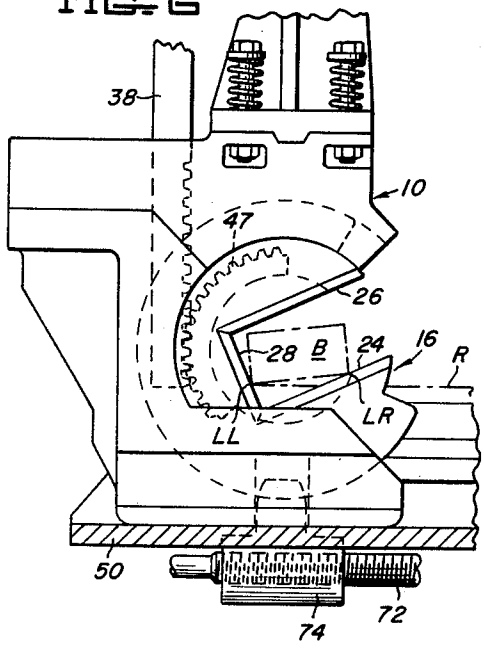


FIG. 7

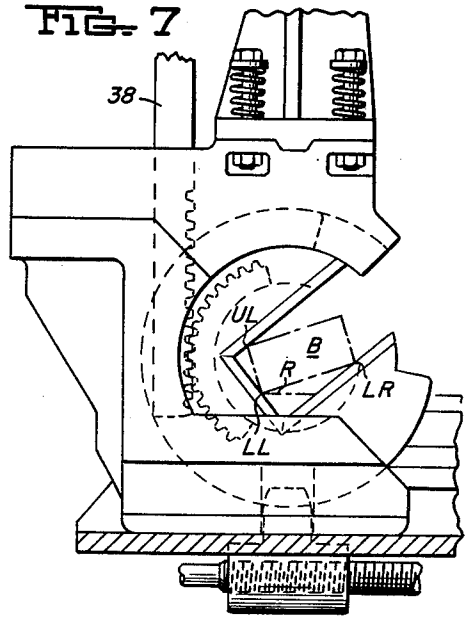


FIG. 8

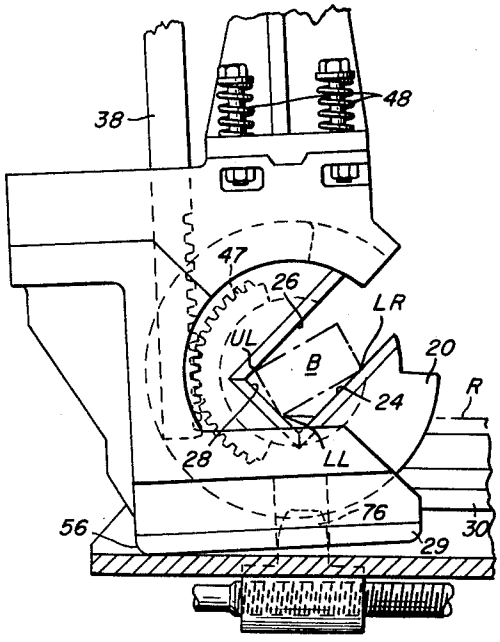
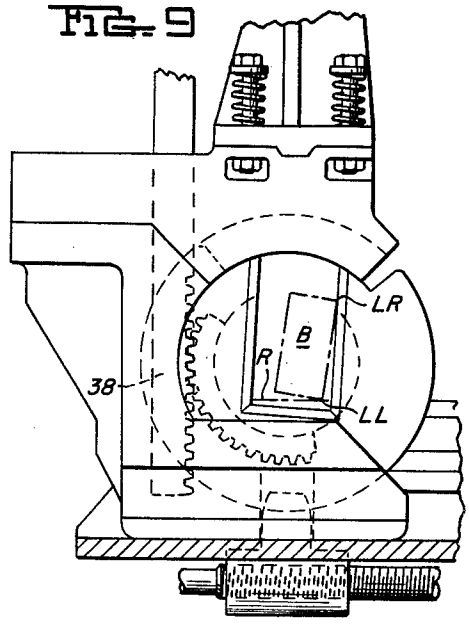


FIG. 9



INVENTOR
ARTHUR W. JOHNSON
By Donald G. Dalton
Attorney

United States Patent Office 3,156,138 Patented Nov. 10, 1964

3,156,138

BAR TURNER

Arthur W. Johnson, 3851 W. 61st St. Chicago 29, Ill.

Filed Aug. 21, 1962, Ser. No. 218,275
4 Claims. (Cl. 80—53)

This invention relates to materials handling devices and, more particularly, to billet turners.

In rolling mills for hot reducing steel billets it is usually necessary to turn the billets between successive passes in order to properly position the billets for the next pass. For this purpose it is necessary to provide billet turning devices associated with the conveyors of the rolling mills which will engage the billets and turn them 90°. These turning devices should be of as simple construction as possible to prevent jamming and malfunctioning from scale and other foreign material normally present around the mill. Additionally, the billet turning devices should be quickly and easily positionable transversely across the entry conveyors so that they can engage the billet no matter what its lateral position is on the entry conveyor.

It is therefore a principal object of this invention to provide an improved billet turning device.

A more particular object of this invention is the provision of a billet turning device of simple construction which can be readily positioned transversely across a conveyor.

Still a further object of this invention is the provision of a billet turning device having a tiltably mounted housing to prevent jamming when returning the billet.

Other objects and advantages of the invention will become apparent from the following description and the accompanying drawings, in which:

FIGURE 1 is an end elevational view partially in section of the billet turning device of this invention;

FIGURE 2 is a detailed sectional view of a portion of the device of FIGURE 1;

FIGURE 3 is a view looking substantially in the direction of line III—III of FIGURE 2;

FIGURE 4 is a side elevational view partially in section of the device of FIGURE 1;

FIGURE 5 is a view looking substantially in the direction of line V—V of FIGURE 3; and

FIGURES 6 through 9 are progressive views of a billet being turned by the device.

Referring now to the drawings and more particularly to FIGURES 1 through 5, the billet turning device of this invention is shown interposed between two rollers R of a roller conveyor associated with a rolling mill (not shown). Billets B, one of which is shown in phantom outline in FIGURES 1 and 5, are supplied by the rollers of the conveyor to the rolling mill. The billet turning device of this invention is adapted to turn the billets 90° about a longitudinal axis before the billets enter into the mill or between successive passes through the mill.

The billet turning device includes a housing 10 supported by a support frame 12 which extends transversely between a pair of the rollers R. The housing 10 has a generally C-shaped bearing surface 14 which rotatably supports a C-shaped turning member 16. The bearing surface 14 is provided with a pair of circumferentially extending grooves 18 in which are disposed a pair of extensions or projections 20 which extend around the turning member 16. This projection and groove mounting permits rotary movement of the turning member 16 but prevents lateral or axial movement thereof. The turning member 16 is provided with walls defining a wrench-like opening 22 adapted to engage and support a billet for turning. The opening 22 is defined by a lower surface 24, an upper surface 26, and a side surface 28. These surfaces engage the edges of a billet during turning in a manner which will be described.

The lower part of the housing 10 is provided with a flange 29 and the support frame 12 is provided with a projection 30 normally spaced above the flange 29 which will allow limited vertical movement of the housing 10 on the support frame 12.

A support tower 32 is mounted on the housing 10 and supports an air cylinder 34. The air cylinder 34 includes a reciprocal piston rod 36. A rack 38 is connected to the end of the piston rod 36 by a bolt 40 extending from the rack with its head disposed in an enlarged bore 42 formed at the end of the piston rod 36. The rack 38 is slidably mounted in a guide groove 44 formed in the housing 10. The rack 38 has conventional teeth 46 which mesh with gear teeth 47 on the turning member 16. When the rack is driven reciprocally it will convert this reciprocal movement into rotary movement of the turning member 16 in a conventional manner. The support tower 32 is connected to the housing 10 by conventional spring and bolt mountings 48. The support frame 12 is made in the form of a U-shaped channel having a base plate 50 and a pair of side plates 52. The lower surface of the housing 10 designated by the reference character 54 rests on the base plate 50. The two extreme ends of the lower surface 54 are beveled or rounded as at 56 and 58, the purpose of which will be explained presently.

A pair of girders 60, 62 are provided extending longitudinally below rollers R, and the support frame 12 is mounted on these girders by mounting assemblies 64 and 66. A bearing 68 is contained in the mounting assembly 64 and a bearing 70 is contained in the mounting assembly. 66. A shaft 72 extends below the support frame 12 and is rotatably supported by the bearings 68 and 70. The shaft 72 is threaded intermediate its opposite ends and a nut 74 is threadably engaged thereon. The nut 74 includes a pin 76 which projects through an opening 78 provided on the base plate 50. The pin 76 extends through the opening 78 into a bottomed hole 80 extending in from the lower surface 54 of the housing 10. The hole 80 is slightly larger than the pin 76 so that there is a loose fit therebetween.

The end of the shaft 72 is provided with a sheave 82 which is connected to a hand wheel 84 by a conventional chain 86. Rotating the hand wheel will cause rotation of the shaft 72 which will move the nut 74 on the shaft. The pin 76 on the nut 74 engages the housing and moves the housing with the nut. This will position the housing transversely with respect to the conveyor.

Operation

The housing 10 is adjusted transversely of the conveyor as described above by turning the hand wheel so that the turning member 16 is positioned for the walls of the opening 22 to engage the billet to be turned.

Prior to receiving the billet, the turning member 16 is maintained in the position shown in FIGURE 1 and in this position is ready to receive and turn the billet about a longitudinal axis. In this position, the rack 38 is raised, and the lower surface 24 of the opening 22 is in a horizontal position and disposed below the top plane of the rollers R so that a billet can be freely moved on the rollers R without striking the surfaces of the opening. The housing has been previously positioned so that the billet, when ready for turning, will be located as shown in FIGURE 1 with respect to the opening 22. In order to turn the billet 90° the air cylinder 34 is actuated which drives the piston rod 36 and rack 38 downwardly. This will cause the turning member 16 to rotate 90° counterclockwise from the position shown in FIGURE 1. The positions and movements of the various components of the turning device during the turning of a billet are shown in FIGURES 6 through 9.

As can be seen in FIGURE 6, during the initial portion

of the turning cycle the lower left edge LL of the billet will contact the side surface 28 and the lower right edge LR of the billet will contact the lower surface 24. Upon continued rotation of the turning member 16 the billet will slide on these two surfaces until the upper left edge UL of the billet comes into contact with the upper surface 26. This position with the three edges contacting the three surfaces is shown in FIGURE 7. When the billet has attained the position of FIGURE 7 it has a three-point contact and hence is not free to slip or slide as it could when moving from the position shown in FIGURE 6 to that as shown in FIGURE 7. Therefore, continued rotation of the turning member from the position shown in FIGURE 7 will force the billet downwardly against the roller R causing a downward directed force on the roller R. An equal and opposing force is exerted upwardly on the housing 10 by the roller R. Since the housing 10 is not rigidly tied to the base plate 50 but is freely resting thereon, continued turning from the position of FIGURE 7 will cause the housing to tilt about beveled edge 56 as seen in FIGURE 8. Thus the housing is tilting about an axis parallel to and laterally spaced from the longitudinal axis about which the billet is being turned. This tilting movement will prevent jamming of the billet against the roller R, thus allowing continued rotation of the turning member 16. As rotation of the turning member 16 continues, this upward tilting movement of the housing will continue until the billet has been turned so that the lower left edge LL has passed the top of the roller R at which point the maximum tilting of the housing is reached and upon continued rotation the turning member will tilt back down until its lower surface 54 comes to rest on the base plate 50 and the billet has been turned 90°. This final phase of the turning is shown in FIGURE 9.

When the housing is tilting upwardly and returning, it is guided in this movement by the pin 76 residing in the bottomed hole 80 in the housing. As was indicated above, the fit between the pin 76 and the hole 80 is loose thus permitting the housing to pivot without binding while still acting as a guide for the tilting movement. Also, the projection 30 prevents the housing 10 from completely separating from the support member 12.

The loose fit between the bolt 40 and the enlarged bore 42 and the spring and bolt mountings 48 acts to absorb shock caused by any accidental ramming of billets against the billet turner.

While one embodiment of my invention has been shown and described it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. A billet turning device adapted to turn a supported billet about a longitudinal axis, said device comprising, a base member, a housing member supported on said base member, a rotary member carried by said housing member, said rotary member having means to engage and rotate a billet about its longitudinal axis, drive means adapted to selectably rotate said rotary member, and means providing for tilting movement of said housing member on said base member about an axis laterally spaced from said longitudinal axis during rotation of said rotary member, whereby the tilting movement prevents jamming of the supported billet during turning.

2. The combination of claim 1 wherein the last named means includes means to guide said housing during its tilting movement.

3. The combination of claim 2 characterized by said guide means including a pin projecting into a hole in the housing.

4. The combination of claim 3 characterized by a rotatable threaded shaft, and said pin being carried by a nut threaded on said shaft, whereby rotation of said shaft will move said nut thereby moving said housing member on said base member to position said rotary member for the reception of billets to be turned.

References Cited in the file of this patent

UNITED STATES PATENTS

680,962	Crudington	Aug. 20, 1901
763,307	Mills	June 21, 1904
2,664,215	Bottenhorn	Dec. 29, 1953
3,044,636	Smith	July 17, 1962