Feb. 7, 1939. W. S. SCHICK 2,146,355

BIT SHARPENING ATTACHMENT FOR GRINDING MACHINES

Filed March 11, 1937 2 Sheets-Sheet 1

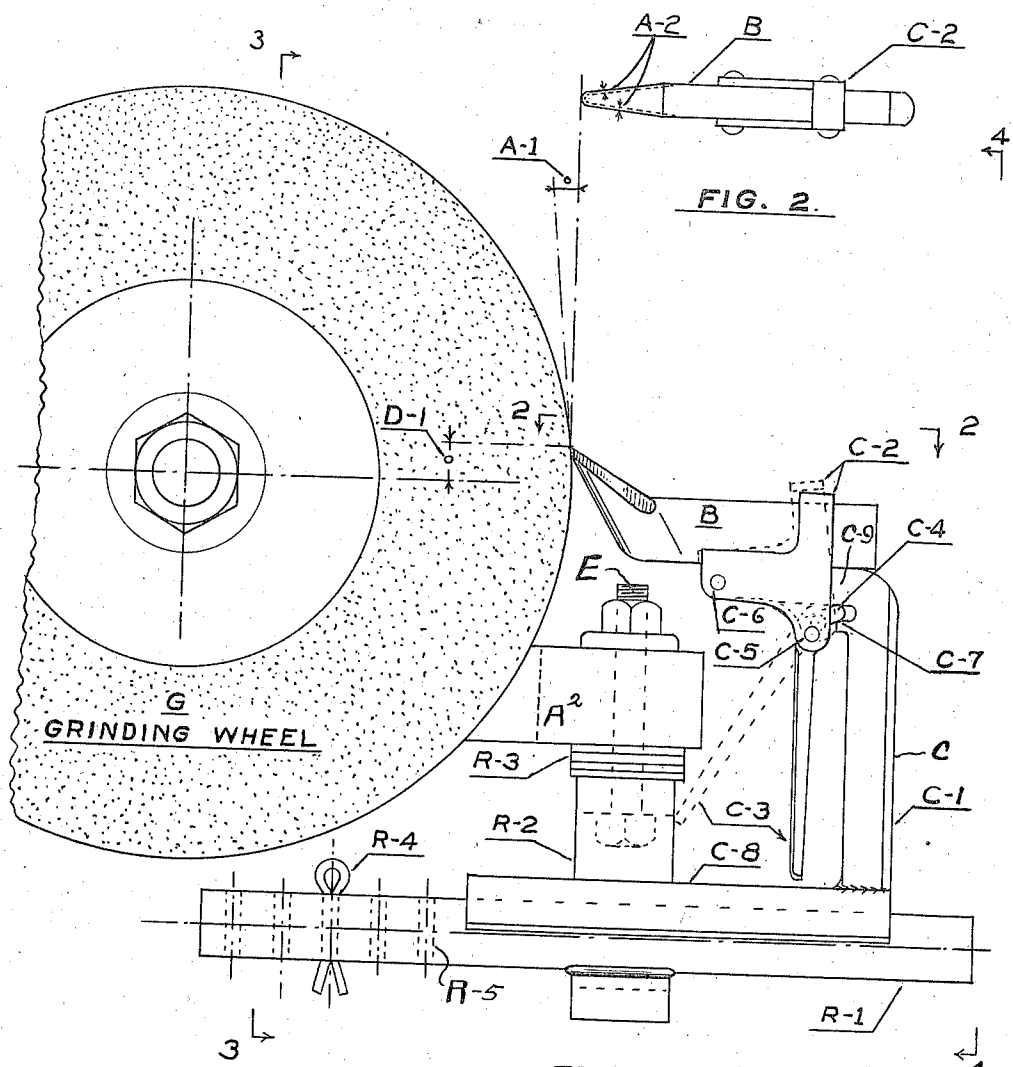


FIG. 2.

FIG. 1

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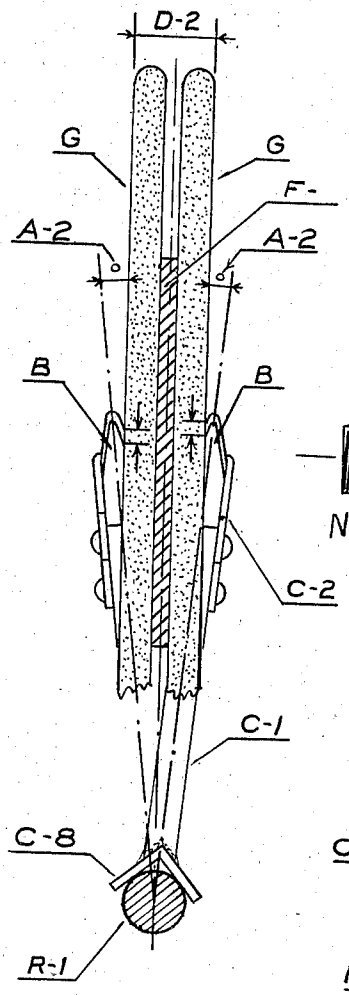


FIG. 3.

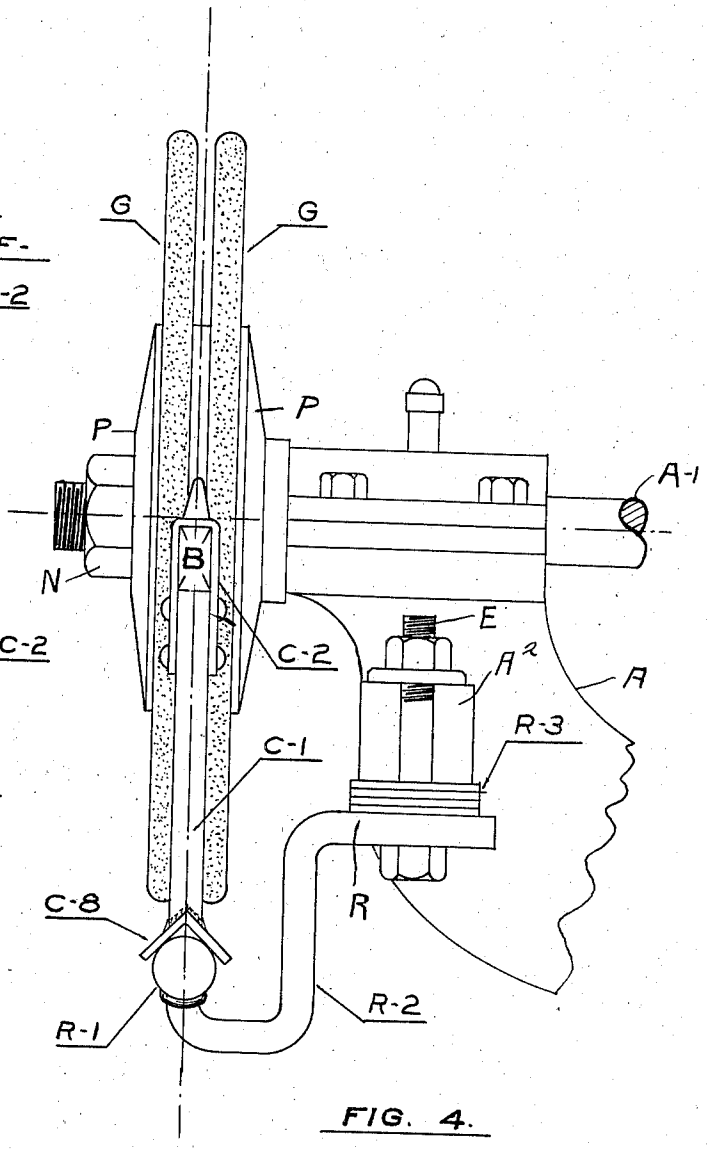


FIG. 4.

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BIT SHARPENING ATTACHMENT FOR GRINDING MACHINES

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Application March 11, 1937, Serial No. 130,381

9 Claims. (Cl. 51—218)

This invention relates to devices for holding tools such as bits used on the cutter chains of coal mining machines while the bits or other tools are being ground, and particularly to a bit holder designed to support a bit while the point of the bit is being beveled and while the sides of the bit are being also beveled.

It is common practice to sharpen the bits used on these coal mining machines by drawing them out on an anvil or rolling out the bit in a sharpening machine built for this purpose. During the past few years, bits have been hard-faced by welding a small amount of borium, stellite or similar hard metal to the cutting face. Bits thus treated will generally permit of re-sharpening by grinding the cutting edges several times during the life of the hard face of the bit depending, of course, upon the nature of the coal being mined.

The general object of my invention is to provide means which will facilitate the re-sharpening of these hard-faced bits by grinding, and a more particular object is to provide a bit holder so mounted that the bit may be rigidly gripped while it is being forced inward toward the grinding wheel.

A further object is to provide a construction of this character which will secure speed in grinding the bits by reason of the provision of means whereby extra pressure can conveniently be applied to the holder and to the bit by both hands of the operator.

A further object is to provide a bit holder which, by providing clamping means for the bit, will eliminate the necessity of the operator holding the bit in his fingers, and thus eliminate the transmission of heat through the bit to the operator's fingers and prevent his fingers from coming in accidental contact with the grinding wheel even though the bit should accidentally slip off the wheel.

Still another and important object is to provide means whereby an exact clearance angle or bevel may be formed upon the end of the bit, this feature being of particular importance in connection with hard-faced bits which require extra strength under the cutting edges to secure the benefits which hard facing affords.

A still further object is to provide a bit holding attachment which may be adapted to any of the grinding machines on the market.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings wherein:

Figure 1 is a face view of a grinding wheel showing my bit support in elevation.

Figure 2 is a top plan view of the bit to be ground and the clamp therefor;

Figure 3 is a diagrammatic elevation of the grinding wheels, the filling or spacer between the wheels, the bits and the rest being shown in section.

Figure 4 is an elevation of the mounting for the grinding wheels and of the bit support and its rest or rail.

Referring to these drawings, A designates a bracket or bearing member which supports bearings for the shaft A' upon which a pair of spaced grinding wheels G are mounted, the wheels being held in spaced relation by the intermediate spacer or filler F and held clamped against this filler by the clamp plates P and the nut N.

Projecting laterally from the bracket A is an arm A—2 which is forked or slotted at its outer end. Extending through the slot of the arm A—2 is a bolt E having a nut and washer at its upper end bearing against the upper face of the arm A—2. The lower headed end of the bolt supports an arm R and between the face of the arm A—2 and of the arm R are disposed a plurality of removable washers or shims designated R—3. The arm R constitutes part of a tool rest. At its upper end, the arm R is horizontal, see Figure 4. It extends toward the grinding wheel or wheels G, then downward at R—2, then to a point beneath but in line with the middle of the spacer F, then upwardly, and at its upper end carries a longitudinally extending rest or rail R—1 which is cylindrical in cross-section.

The bit clamp or holder is designated generally C. It comprises a base or slide C—8 which has the form of an inverted V. Welded to the rear end of this base or formed integral therewith is a post C—1 which is angularly extended at its upper end at C—9 towards the periphery of the grinding wheels G. The upper face of this angular portion is flat to receive upon it the underface of the bit B. To the forward end of this portion C—9 is pivoted the forwardly extending arms C—6 of a bit clamp C—2 having the form in elevation of a bell crank lever. This bit clamp is U-shaped in cross-section and extends over the upper face of the shank of bit B, as shown in Figures 1, 2 and 4, and extends downward on each side of the bit and of the portion C—9 of the post. The inner face of the post C at its junction with arm C—9 is formed with a slot C—7. Pivoted on a pin C—5 is a lever C—3 which has an outwardly projecting

rounded nose C—4 which engages in this slot C—7. The lower wall of this slot forms a fulcrum for the rounded end of the lever C—3.

When this lever is shifted to the dotted line position in Figure 1, the clamp C—2 will be raised from the bit B, but when the post C—1 and the lever C—3 are gripped by the operator's hand, the bit clamp will be pulled down and the bit held rigidly against the bit support C—9.

By means of this clamp, the bit B may be held with its cutting edge against the wheel or wheels G, as shown in Figure 1, and forced forward as the grinding is carried on. The base or slide C—8 allows the bit support to slide back and forth or to be swung laterally from side to side around the curved surface of the rest or rail R', as indicated in dotted lines in Figure 3, while bringing the point and sides of the bit into contact with the corners of the grinding wheels G while sharpening.

It is necessary, of course, that a clearance angle be given to the cutting edge or point of the tool. The amount of this angle or bevel is controlled by the shims or washers R—3 disposed between the underface of the arm A—2 and the upper face of the arm R, as shown in Figures 1 and 4. It will be evident that the more shims R—3 which are used, the further down the bit B will be brought toward or into coincidence with a horizontal line or plane extending diametrically through the grinding wheels and that the fewer shims R—3 that are used, the higher the point of the bit will be brought above this diametric line or plane. The higher the cutting bit is brought with reference to this diametric plane, the greater will be the angle or bevel given to the extremity of the bit. This is clearly shown in Figure 1 where the clearance angle of the bit is indicated by the dotted lines X. Means are provided, namely, a stop pin R—4, to limit the movement of the slide C—8 so as to prevent the grinding action being carried too far back on the tool through the inadvertence of the operator. This stop pin R—4, shown as a cotter pin, may be disposed in any one of a plurality of perforations R—5 in the rail R—1.

While a single grinding wheel G may be used, I have illustrated two wheels spaced from each other by the spacing or filling member F. Since most of the grinding is done on the corners of the wheels, the use of two wheels, as shown in the drawings, will permit of reversing the wheels from time to time and in this way economizes in the use of grinding wheels.

In the operation of this structure, the lever C—3 is thrown to the dotted line position and then the shank of the bit B may be inserted beneath the clamp C—2. Then the operator, by bringing his fingers around the lower end of the lever C—3, will draw the clamp downward and securely clamp the shank of the bit B against the part C—9. Then by pushing inward on the post C with any desired pressure, the bit may be brought against the grinding wheel for the grinding action. When changing bits, the bit support is removed from the rest or rail R—1, the operator shifts the lever C—3 to its dotted line position and this, through the action of the nose C—4, raises the clamp C—2 to its dotted line position, permitting the bit to drop out while the tool is being held in an inclined position.

While in this open position, the next bit B is inserted beneath the clamp C—2 and then the clamp drawn downward to its clamping position and the bit of the holder is ready for replacement upon the rail R—1. It will be seen that when the shank of the bit is brought down firmly against the upper face of the angular portion C—9, the bit must be held in correct alinement for grinding. Then the holder is replaced upon the rail R—1 and the grinding operation carried out. The slide or base C—8, when it is placed on the rest or rail R—1, permits the tool holder to slide back and forth and also to swing from side to side while bringing the points and sides of the bit into contact with the corners and face of the grinding wheel.

The clearance angle indicated by the lines X under the point of the bit, is adjusted by regulating the distance indicated by the lines D' above the center line on the grinding wheel by means of adding to or removing the necessary number of washers or shims.

In Figure 3, I have shown the relative positions of the holder and of the bit B when grinding the lateral cutting edges of the bit. The rest or rail R—1, it will be noted, is located in the same plane as the medial plane of the wheel or wheels G as the case may be. This gives the same side clearance on both sides of the bit B. This side clearance under the cutting edges of the bit B is governed by regulating the distance D—2 across the face of the wheels, as shown in Figure 3. This regulation is secured by making the thickness of the filler or spacer F such as to suit the requirements for grinding the particular tool or bit.

I do not wish to be limited to the particular bends of the arm R, as shown in Figure 2. This arm R, it is to be understood, is to be bent to suit the requirements for connecting the rail R—1 to any particular grinder which might be selected for use. The particular shape of this arm R would be governed by the grinder used.

The advantages of this grinding tool are as follows:

First, the formation of an accurate clearance angle under the cutting edge of the bit.

Second, clearance angles can be produced which will impart much greater strength to the cutting point of the bit than can be produced on the regular roller type of bit sharpener. This feature is of special importance where hard-faced bits are being sharpened, which hard-faced bits require extra strength under the cutting edges to get the benefits which hard-facing affords.

Third, speed in grinding is secured by reason of the extra pressure which the operator can readily apply by using both hands. Furthermore, the heat generated in the bit is not transmitted to the operator's fingers as is the case where the bits are held in the fingers.

Fourth, accurately sharpened bits can be produced without any special skill or judgment on the part of the operator.

Fifth, short bits can be ground with the same speed and accuracy as long bits.

Sixth, the use of this bit holder secures greater safety against injury to the operator's fingers from accidental contact with the grinding wheel than is the case where the bits are simply held in the fingers of the operator. The stop pin R—4 limits the movement of the tool toward the grinding wheel and in doing so prevents accidental contact with the grinding wheel by the operator's fingers if the bit should be allowed to slip off the face of the grinding wheel.

While I have illustrated a certain preferred form of my invention and certain detailed construction, it will be obvious that the principle of

the invention might be retained while the details are modified without departing from the spirit of the invention. Furthermore, it is to be understood that this structure might be used for grinding other tools besides tool cutting bits, and that this attachment may be readily adapted for use with practically all forms of grinding machines used for the purpose of grinding bits by changing the exact form of the arm R—2. Thus this device is particularly adapted to be used as an attachment applicable to most grinding machines of the type for which it is intended either electric or belt driven, now in general use.

It may be stated that Figure 3 shows how side clearance is obtained by tilting the holder on its rest. The part of the inside face of the tool B which appears to be cut away is hidden from view in Figure 3 by the grinding wheels. Due to a large amount of end clearance (usually 30° or more) and the round formation of the bits, the grinding wheel only removes a small portion from the end and sides of the bit the first few times that the bit is sharpened. When the bits are ground the first time only a very small face is ground away on the point and sides but with repeated grinding, the wheels cut wider faces. It will be seen from Figure 3 that the angle by which the holder must be rocked on rest R—1 in order to grind the respective sides of the bit point will be approximately the exact clearance angle which the wheels will grind on the sides of the bit. Increasing the width of the wheel G (if only one is used) or increasing the distance D—2 in Figure 3 between the wheels, will require a greater rocking movement of the holder on the rest R—1 in order to engage the sides of the bit with the corners of the wheel and thereby produce correspondingly greater side clearance angles under the cutting edges on the sides of the bit. Reducing the width of the wheel face (if only one is used) or the distance D—2 between the wheels, will require less rocking movement of the holder on the rest R—1 and produce proportionately less clearance under the cutting edges of the sides of the bit. The side clearance angle A—2 is in reality the angle by which the holder must be rocked on the rest R—1 from the vertical in order to grind a point on the side of the bit. It is to be undertood that in Figures 1 and 3 I have indicated by shade lines on the bit B the surface which is being ground.

What is claimed is:—

1. The combination with a grinding wheel, of a rail extending in the middle plane of the wheel and at a right angle to its axis of rotation, a slide on the rail having a vertically extending post formed at its upper end to provide a horizontal portion extending toward the periphery of the wheel and at right angles to the rotative axis thereof and formed to provide a tool seat on its upper face, means for clamping the tool to be ground on said seat, said means including a clamping member arching transversely over the seat, and a lever extending donwardly and normally extending parallel to the post and constructed and arranged to draw the clamping member downward against the tool being ground when the lever is drawn towards the post.

2. The combination with a grinding wheel, of a rail extending parallel to but beneath the wheel, a slide on the rail having a vertically extending post formed at its upper end to provide a horizontal portion extending toward the wheel and formed to provide a tool seat on its upper face, means for clamping the tool to be ground on said seat, said means including a clamping member arching over the seat and having forwardly extending arms embracing the horizontal portion of the post and pivoted to the forward end thereof, and a downwardly extending lever pivoted to the sides of said clamping member and having a nose extending toward the post and fulcruming against the post whereby to urge the clamping member downward when the lever is drawn towards the post.

3. The combination with a grinding wheel, of a rail extending parallel to but beneath the wheel, a slide on the rail having a vertically extending post formed at its upper end to provide a horizontal portion extending toward the wheel and formed to provide a tool seat on its upper face, means for clamping the tool to be ground on said seat, said means including a clamping member U-shaped in cross-section to provide two downwardly extending side walls, the side walls being formed each with a forwardly projecting arm, the forwardly projecting arms being pivoted to the forward end of the horizontal portion of the post, and a downwardly extending lever normally disposed parallel to the post and pivoted to the lower ends of said side walls, the lever having a nose directed toward the post and the post having a slot into which said nose extends and constituting a fulcrum for the lever.

4. The combination with a grinding wheel, of a rail extending beneath the grinding wheel in the middle plane thereof, a slide supported upon said rail for free longitudinal movement, a post carried by said slide and extending upward to a point nearly opposite a horizontal plane radial to the wheel, means for clamping the tool to be ground upon said post, and means for raising or lowering the post to carry the point of the tool a predetermined distance above a horizontal plane radial to the grinding wheel whereby to bevel the edge of the tool, the rail having a transversely convex upper face and the slide fitting on said rail and being oscillatable transversely whereby to permit the side edges of the tool to be brought in contact with the side faces of the grinding wheel.

5. The combination with a grinding wheel, a bracket supporting the grinding wheel, said bracket having an arm projecting from the bracket in parallel relation to the grinding wheel, a bolt passing downward through the arm, a supporting member carried by the bolt and extending laterally and downward to a point beneath the middle plane of the wheel, a rail carried by the supporting member and extending parallel to the middle plane of the wheel, a slide mounted upon the rail and having free longitudinal and free transverse rocking movement upon the rail, the slide having a post extending upward therefrom and angularly bent at its upper end, the upper face of the angular portion being formed to provide a tool seat, and means carried by the post for clamping a tool against said seat.

6. The combination with a grinding wheel, a bracket supporting the grinding wheel, said bracket having an arm projecting from the bracket in parallel relation to the grinding wheel, a bolt passing downward through the arm, a supporting member carried by the bolt and extending laterally and downward to a point beneath the middle plane of the wheel, a rail carried by the supporting member and extending parallel to the middle plane of the wheel, shims disposed between the underface of the arm and the upper face of the supporting member whereby the sup-

porting member may be raised or lowered relative to the arm and wheel, a slide mounted upon the rail and having free longitudinal and free transverse rocking movement upon the rail, the slide having a post extending upward therefrom and angularly bent at its upper end, the upper face of the angular portion being formed to provide a tool seat, and means carried by the post for clamping a tool against said seat.

7. The combination with a grinding wheel, of a rail extending at right angles to the axis of and in the middle plane of the wheel, a slide mounted upon said rail for longitudinal movement therealong toward and from the periphery of the wheel and at right angles to the axis of rotation thereof and for transverse rocking movement, a post extending upward from the slide and formed at its upper end to provide a seat for the tool to be ground, means for clamping the tool upon the seat, and means for vertically adjusting the rail to thus vertically adjust the tool being ground relative to a horizontal plane radial to the center of the wheel to thus control the clearance angle to be cut on the end of the tool, the slide and post being oscillatable upon the rail whereby the sides of the tool at its point may be ground against the side faces of the wheel.

8. The combination with a grinding element comprising two wheels disposed in parallel relation, and means whereby the wheels may be separated a greater or less distance from each other, of a rail extending parallel to the middle plane of the element and beneath the element, a slide mounted upon said rail for longitudinal movement therealong and for transverse rocking movement, a post extending upward from the slide and formed at its upper end to provide a seat for the tool to be ground, means for clamping the tool upon the seat, and means for vertically adjusting the rail to thus vertically adjust the tool being ground relative to the horizontal plane radial to the center of the element to thus control the clearance angle to be cut on the end of the tool, the slide and post being oscillatable upon the rail whereby the sides of the tool at its point may be ground against the side faces of the wheel.

9. The combination with a bracket having a bearing and a grinding wheel having a shaft passing through the bearing, of an arm projecting out from the bracket parallel to the grinding wheel and beyond the periphery thereof, of a bolt passing downward through the arm, a rail supporting member having a portion thereof disposed beneath the underface of the bracket, removable shims disposed between the underface of the arm and the upper face of the bracket, the supporting member extending downward to a point below the middle plane of the wheel, a rail supported upon said member and extending parallel to the wheel and in the middle plane thereof, a longitudinally adjustable stop carried by the rail, a slide engaging the rail and having free longitudinal and free transverse rocking movement thereon, the slide at its outer end having an upwardly extending post, the post at its upper end being angularly bent toward the periphery of the grinding wheel and formed to provide a seat for the tool to be ground, a clamp embracing and arching over the horizontal portion of the post and adapted to engage the shank of a tool to be ground, the clamp being pivoted to the forward end of the horizontal portion of the post, and a lever carried by said clamp and normally extending downward approximately parallel to the post and operatively engaging the post to cause the downward movement of the clamp upon a movement of the lever toward the post.

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