April 25, 1939. G. J. THOMAS 2,156,034

TOOTH REST

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Fig. 1.

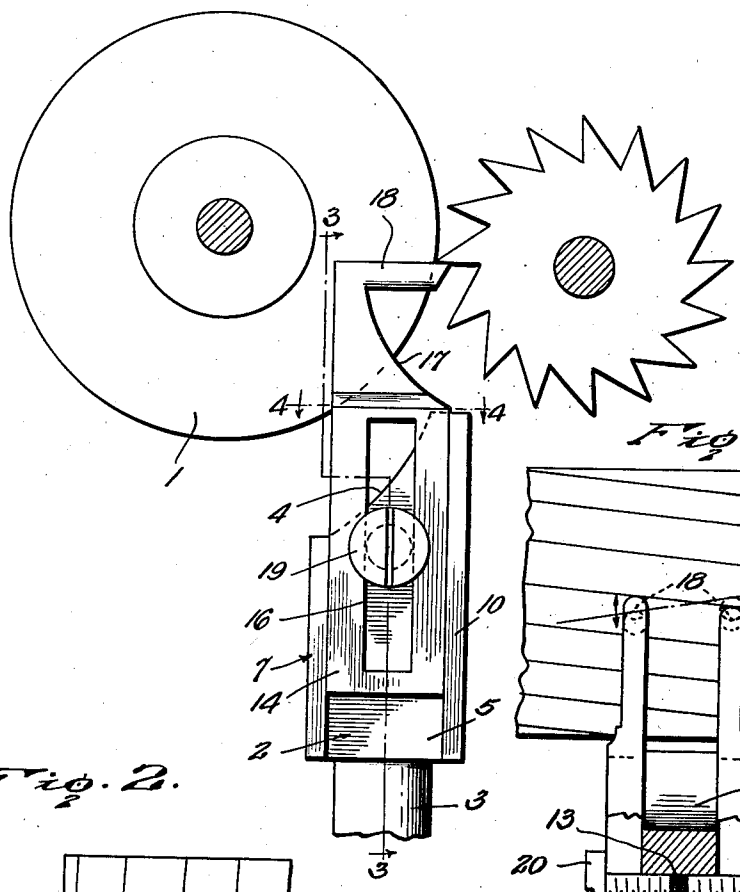


Fig. 2.

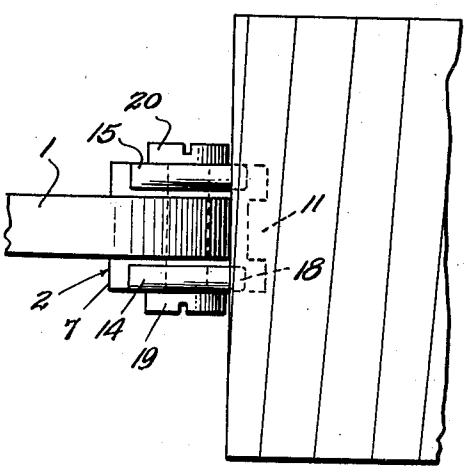


Fig. 3.

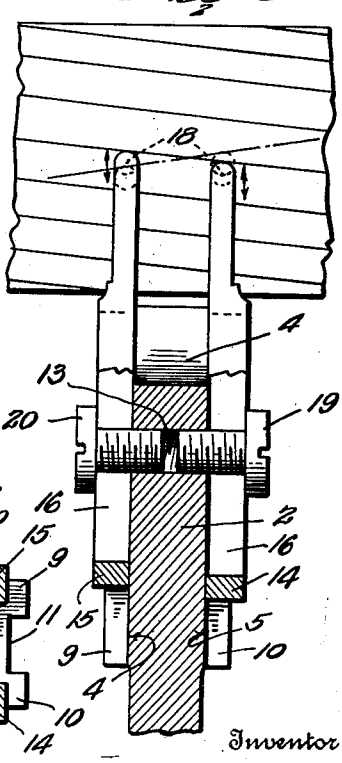
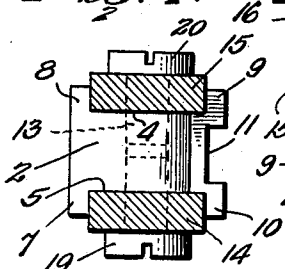


Fig. 4.



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Fig. 5.

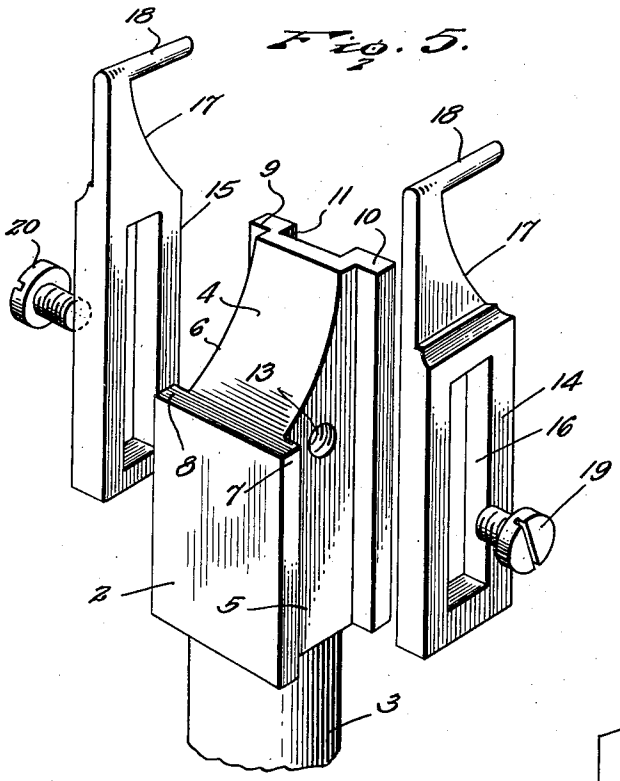


Fig. 10.

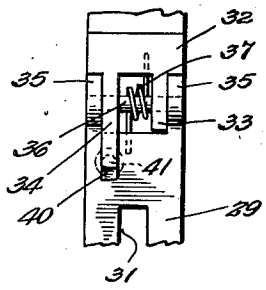


Fig. 9.

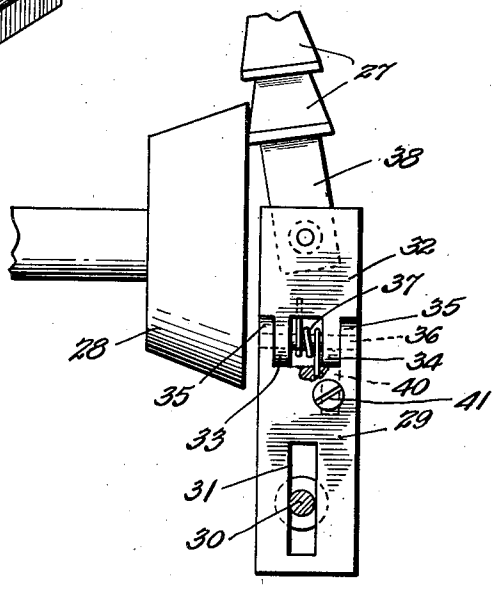
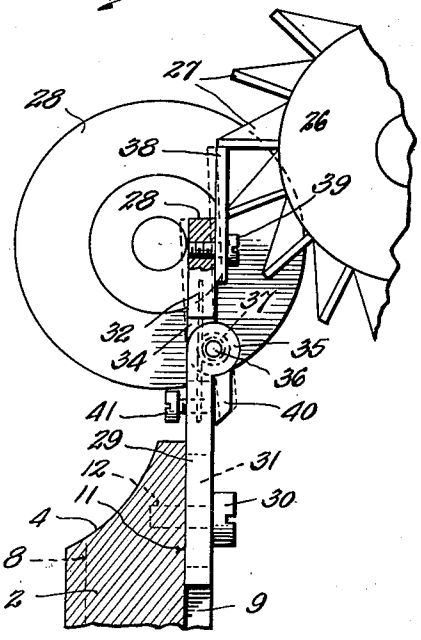


Fig. 8.



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Fig. 6.

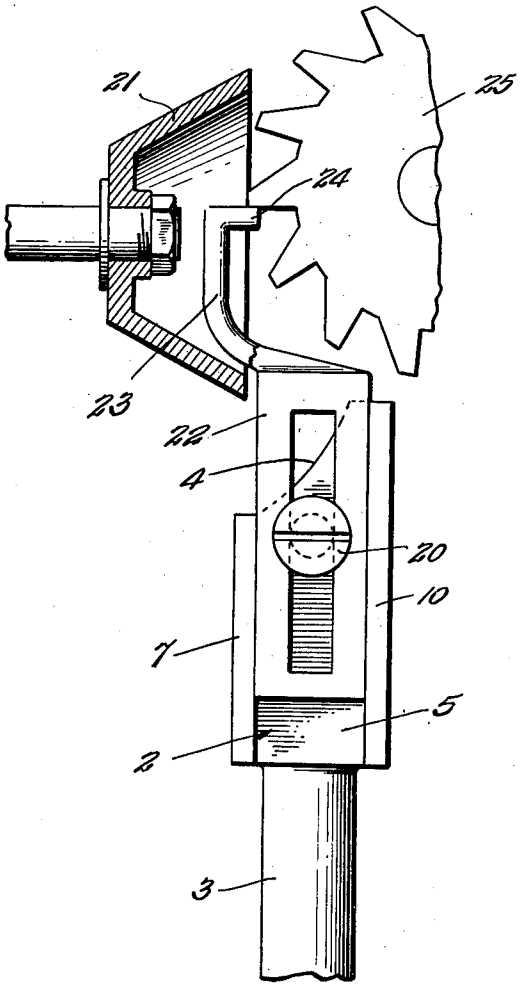
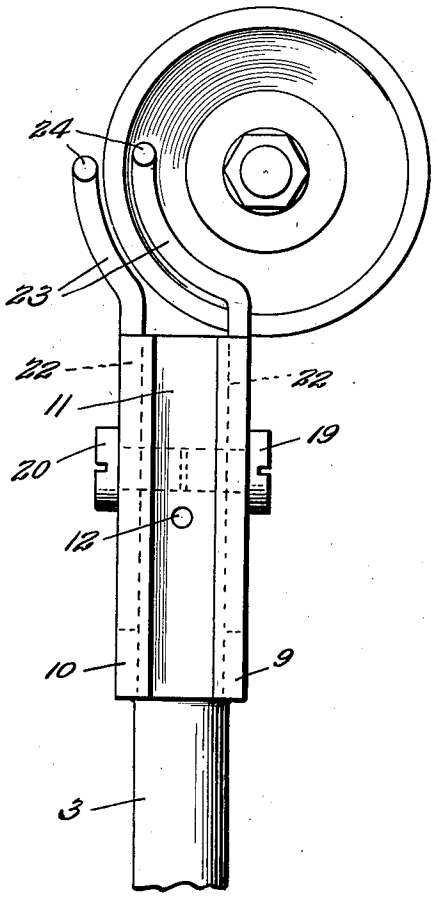


Fig. 7.



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UNITED STATES PATENT OFFICE

2,156,034

TOOTH REST

George J. Thomas, Newark, N. J.

Application May 17, 1937, Serial No. 143,196

4 Claims. (Cl. 51—225)

This invention relates to an improved tooth rest for engaging and supporting the tooth of a milling machine cutter in such a position that the tooth will be ground accurately during the sharpening of said tooth by a grinding wheel of any shape.

The prime object of this invention is to provide a tooth rest with interchangeable tooth-supporting blades or arms so that it will be more adaptable as a tooth support to the various kinds of cutters used on milling machines as well as the various kinds and shapes of grinding wheels used for grinding these cutters.

A further object of the invention is to provide a tooth rest which may be easily mounted adjacent a grinding wheel and provided with tooth-supporting blades which may be easily and quickly adjusted to suit the contour and angle of the teeth of the cutter being ground or sharpened.

And the invention seeks as a further object to provide a device of this character having interchangeable blades which may be adjusted to accommodate themselves to the teeth of the cutter to be sharpened and so support a tooth that it may be ground without likelihood of its slipping out of its proper position.

Other and incidental objects of the invention not specifically mentioned in the foregoing will render themselves apparent during the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevation showing the improved tooth rest mounted in operative relation to a cutter and a grinding wheel and illustrating the manner in which arms of the tooth rest support a tooth of a cutter,

Figure 2 is a top plan view of Figure 1 and showing the spirally extending teeth of the cutter,

Figure 3 is a vertical sectional view on the line 3—3 of Figure 1, looking in the direction indicated by the arrows,

Figure 4 is a horizontal sectional view on the line 4—4 of Figure 1,

Figure 5 is a detail perspective or exploded view of the device.

Figure 6 is a view similar to Figure 1, showing a form of tooth-engaging plate used with a hollow cup-shaped stone,

Figure 7 is a view looking from the right in Figure 6 with the cutter omitted,

Figure 8 is a vertical sectional view showing one of the tooth-engaging plates or rests mounted for grinding the side teeth of milling cutters,

Figure 9 is a view in rear elevation of the structure shown in Figure 8, and

Figure 10 is a fragmentary view in front elevation of the hinged plate shown in Figures 8 and 9.

Referring now more particularly to the above briefly described accompanying drawings, wherein like numerals of references will be seen to designate like parts throughout the various views, the numeral 1 indicates a grinding wheel which may be of any desired construction. The grinding wheel may, of course, be mounted and driven in any suitable manner.

In carrying my invention into effect, I employ a vertically disposed block or body 2 which is substantially rectangular in cross section and preferably formed integral with a suitable support 3 which may be square, round or of any desired shape. The body 2, as well as the support 3, is made of any suitable material and said support may, if desired, form a part of or be mounted on a grinding machine.

As best seen in Figures 1 and 5 of the drawings, the body 2 terminates at its upper end in an arcuate face 4 which is adapted to confront the grinding wheel 1 in spaced relation thereto. The face 4, being arcuate in contour, will permit the body to be mounted in a position to dispose its upper end in the necessary limited space between the grinding wheel 1 and the cutter being ground, as shown in Figure 1. Formed in the body 2 throughout its length and at opposite sides thereof are channels 5 and 6 which have flat inner surfaces and define retaining strips or flanges 7, 8, 9 and 10. The strips 9 and 10 provide extensions along the flat corners of the body 2 and also provide a channel 11 between them along the front of the body. Threaded openings 12 and 13 have been shown leading from the channels 5, 6 and 11. While these openings have been shown in certain positions in the drawings, it is to be understood that they may be located wherever desired within the length of the channels and that additional threaded openings may be provided if so desired.

In order to engage a tooth to be ground, I provide certain interchangeable supporting plates or blades, the details of which will be explained in regular order as I proceed with the description of the improved tooth rest. Supporting plates 14 and 15 which are shown in Figures 1, 2, 3, 4 and 5 are adapted to be mounted in the channels 5 and 6 and are of such width that they fit snugly in these channels to prevent any side play. Each of these supporting plates is substantially rectangular throughout the major portion of its

length from the lower end and provided with a longitudinally extending slot 16. These plates which may be of the same thickness throughout or have their upper portions reduced in thickness, as shown in Figure 3, are cut away to provide arcuate faces 17 and define tooth-engaging arms 18 which extend transversely of the plates at right angles to the length of the supporting plates, as shown in Figures 1 and 5. These plates 14 and 15 are held in vertically adjusted positions in the channels or recesses 4 and 5 of the body by means of screws 19 and 20 which are passed through the slots 16 of the plates and screwed into the threaded opening 13 from opposite sides of the body. It will be understood that by loosening the screws 19 and 20, the plates 14 and 15 may be shifted upwardly or downwardly in their channels. Of course, one of the plates may be shifted independently of the other and thus accommodate the device for use with a cutter having straight or spiral teeth. The cut-away portions 17 will, as best seen in Figure 1, permit the plates 14 and 15 to be moved into close proximity to the tooth of a milling machine cutter or the like so that the arms 18 will be in a suitable position at each side of the grinding wheel 1. It will be seen, especially by one who understands the work of cutter grinding or sharpening, that the arms 18 can be adjusted in any position necessary to do the work of grinding or sharpening many of the various kinds of milling machine cutters in the most perfect manner by passing the cutter longitudinally of itself across the grinding edge of the grinding wheel with its tooth engaging the arms when adjusted as just explained. After one tooth has been ground, the next tooth will be brought into position to rest upon the arms and the cutter again passed longitudinally across the face of the grinding wheel, and so on with each tooth until the cutter is properly ground.

When a cup-shaped grinding wheel is used, which is necessary for grinding or sharpening some cutters, end mills and the like, plates which have an elongated and different shaped top or upper part are used, as shown in Figures 6 and 7. These plates 22, with the exception of the curved and offset elongated portions 23 terminating in arms 24 corresponding to the arms 18, are of the same construction as the plates 14 and 15 and are attached to and adjusted on the body 2 in the same way. The elongated curved and offset parts 23 are necessary to dispose the arms 24 in the recess or hollow of the cup-shaped wheel close to the sides of same, one within the recess and the other externally of the wheel, so that the arms can be brought into proper position for use, as shown in Figures 6 and 7. It is necessary, as shown in Figure 7, to have the arms 23 as near the wall, edge or rim of the cup-shaped wheel as possible with safety. It will be seen by the figures referred to that the portions 23 of the plates 22 are offset to enter the cup of the wheel and curved longitudinally in both directions, and it is to be understood that these offsets and curved portions can be of any size or shape necessary to fit the grinding wheel in use. It will also be understood that the arms 23 may be curved either towards the left as shown in Figure 7 or towards the right. When the arms 24 of these plates 22 are adjusted in position for grinding a milling cutter, as shown in Figure 6, the tooth of the cutter being ground is supported thereby and is ground in the same manner as when supporting plates 14 and 15 are used, as will be understood by anyone skilled in cutter grinding.

Certain kinds of cutters are called "side milling cutters". These cutters have teeth at the side as well as on the front edge, as shown in Figures 8 and 9, wherein the cutter is indicated in general by the numeral 26 and the teeth by the numeral 27. Of course, the side edges of these teeth must be ground as well as their front edges. In order to do this, the support 2 is not mounted on the grinding wheel head and, therefore, stationary with the grinding wheel as is the case when grinding the other kind of cutters for which the plates 14 and 15 are used, but, as is known by those familiar with the art of cutter grinding, the tooth rest must, when grinding the side teeth of a side milling cutter, be mounted so that it will travel or move as the cutter is being moved in passing the side of the tooth across the grinding edge of the grinding wheel. Therefore, the tooth rest is mounted as is also the cutter on the moving part of the grinding machine so that the rest moves with and supports the cutter tooth, the side of which is being ground. A cup-shaped wheel is generally used for this kind of grinding, as shown in Figures 8 and 9, and the support 2 is so mounted in relation to the grinding wheel 28 that the side cutting edges or teeth of the cutter will be brought in contact with the grinding wheel. For grinding side milling cutters, the plate 29, shown in place in Figure 8, is used instead of the plates 15 mounted at the sides of the body 2 and is mounted at the front of the body in the recess 11 where it is adjustably secured by a bolt 30 which passes through a slot 31 formed in the plate and is screwed into the threaded hole 12 of the body 2. If so desired, one of the screws 19 or 20 may be used instead of providing a special screw. The plate 29 has an upper section or auxiliary plate 32 provided at its lower end with hinge ears 33 and 34 which fit between the ears 35 of the main section of the plate and are formed with openings to receive the pivot pin 36 carried by the ears 35. A spring 37 which is coiled about the pin with its arms engaging the main plate and the auxiliary plate yieldably holds the auxiliary plate in the upright position shown in full lines in Figure 8 but permits it to be pressed or pushed to the position indicated by the dotted lines shown in this view. By so mounting the plate 29, a tooth of the cutter may be brought into position to rest upon the upper edge of the blade 38 which is connected with the upper end of the auxiliary plate by a screw 39, and after the side of this tooth has been ground the cutter can be turned so as to bring another tooth up to rest on the blade for grinding. During this upward movement of the tooth, the blade with the auxiliary plate will be pressed or pushed out to the dotted line position shown in Figure 8 and will spring back again as soon as the tooth has been raised high enough to allow it to do so and then act as a rest for that tooth while the side of the same is being ground. This is continued until all the teeth on that side of the cutter have been ground. Then adjustments are made so that the cutter is brought into position for grinding the teeth on its other side. An arm 40 extends downward from the hinge ear 34 to engage the upper part of the plate 29 and limit the extent to which the tooth-engaging blade may be allowed to spring back in position after each tooth has been moved up into position to be supported for grinding.

By properly mounting and adjusting the tooth rest, the support and the cutter with respect to

the grinding wheel, the teeth of the cutter may have their front edges or side edges ground or sharpened. This adjustment will be well understood by all versed in the art of cutter grinding.

It should be noted that, in grinding the side teeth of a cutter, the cutter is tilted a few degrees toward the cup-shaped grinding wheel so as to give a keener cutting edge to the sharpened teeth. This position of the cutter is shown in Figure 9. This view also shows that the blade **38** is set at an angle to conform to the angle at which the cutter is set so that there will be a perfect contact of the tooth blade and the tooth of the cutter while the tooth is being ground. This adjustment of the blade **38** also permits it to have proper engagement with either straight cut or spirally extending teeth either when grinding their front edges or sides.

I have, therefore, provided an improved grinding device adapted for properly supporting cutters provided with any conventional form of teeth and have further provided a device of this character wherein a support is firmly mounted adjacent a grinding wheel and may have tooth-engaging plates mounted either at its opposite sides or at its front according to the type of teeth formed upon the cutter.

While it has been stated that the teeth of the cutter are ground to sharpen them, it is to be understood that, if so desired, the teeth may be ground in order to properly shape them and then sharpened either by grinding or in any other desired manner.

Having thus described the invention, what is claimed as new is:

1. In a tooth rest, a support, a body formed integrally thereon and having side faces formed with vertically extending channels and an arcuate top wall whereby the body may be mounted in place with its arcuate wall in close proximity to the under portion of the peripheral edge face of a grinding wheel, supporting plates slidable vertically on the body within the channels and each having a vertically extending slot, said supporting plates being adapted for disposition beside opposite side faces of the grinding wheel in transverse spaced relation thereto and having portions adapted to engage under a tooth at the front of a cutting tool in spaced relation to each other and support said tooth during grinding of the tooth by the grinding wheel, and means carried by the body engageable through the slots and in the plates for retaining the supporting plate in a predetermined adjusted position in the channel of the body.

2. In a tooth rest, a body having tracks at opposite sides and an arcuate top wall adapted to confront the peripheral edge face of a grinding wheel in close spaced relation thereto, supporting plates carried by the body in said tracks, said supporting plates having cut-away portions adjacent their upper ends defining tapered arms at their upper ends, said body and arms being disposed in straddling relation to the under portion of the grinding wheel and having horizontal fingers extending forwardly and of a length adapting them to engage under and support a tooth of a cutting tool during a grinding operation by the grinding wheel, said cut-away portions of said plates providing recesses under the fingers and permitting the plates to be mounted in close confronting relation to the cutting tool, and means for adjustably mounting the supporting plates in the tracks, said plates being independently adjustable in a vertical direction whereby they may be set to engage under and support a tooth of a cutter having straight or spirally extending teeth.

3. In a device of the class described, a body, a plate carried by the body and having a vertically extending slot, means carried by the body and extending through the slot for retaining the plate in an adjusted position on the body, said plate having hingedly connected upper and lower sections, the upper section having a depending tongue for engaging the lower section and limiting tilting of the upper section in one direction out of a vertical position, a spring yieldably resisting tilting of the upper section in the opposite direction, an adjusting screw carried by the lower section and engageable with the tongue for shifting the upper section against the tension of the spring to a desired adjusted position, and a blade carried by and extending upwardly from the upper section and adapted to engage a tooth of a cutting tool for engaging under and supporting a tooth in operative relation to a grinding wheel during grinding of the tooth by the grinding wheel.

4. In a device of the class described, a body, a plate having a lower section carried by said body and an upper section pivotally connected with the lower section, a spring yieldably resisting pivotal movement of the upper section in one direction, adjustable means for limiting pivotal movement of the upper section in the opposite direction by said spring and disposing the upper section in predetermined angular relation to the lower section, and a supporting blade adjustably carried by the upper section for transverse pivotal adjustment and extending upwardly therefrom into position for engaging under a tooth of a cutting tool whereby said tooth may be supported in a predetermined relation to a grinding wheel during grinding of the tooth by the grinding wheel.

GEORGE J. THOMAS.