Nov. 17, 1931. W. J. IRWIN 1,831,863

PORTABLE GRINDING MACHINE

Filed April 30, 1928 2 Sheets-Sheet 1

Fig. 1

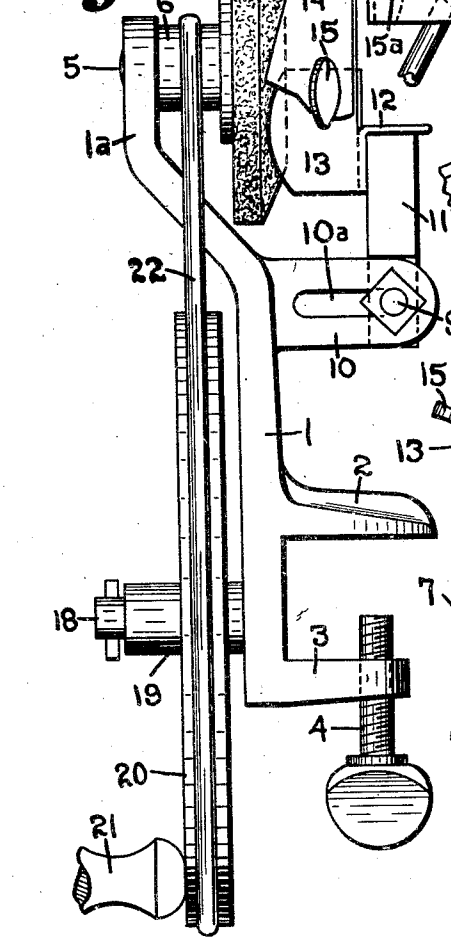


Fig. 2

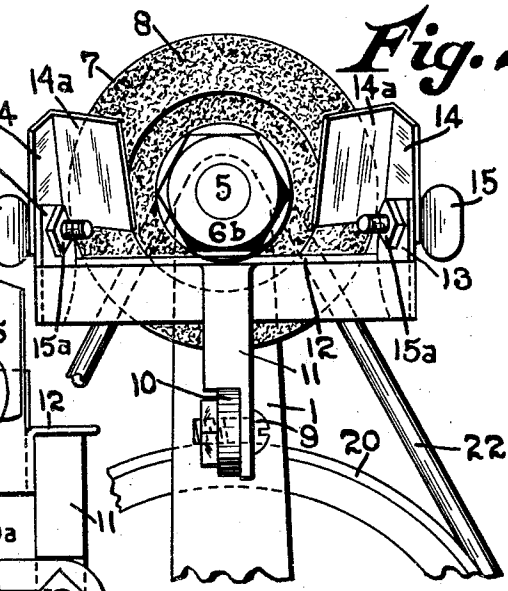


Fig. 3

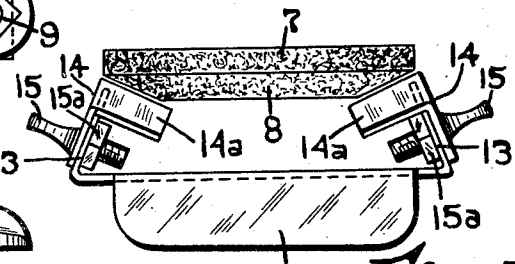
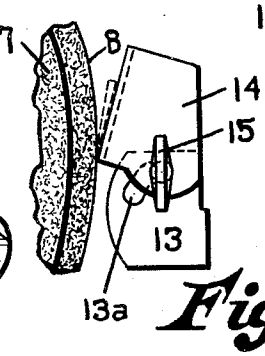


Fig. 4



Witnesses
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PORTABLE GRINDING MACHINE

Filed April 30, 1928 2 Sheets-Sheet 2

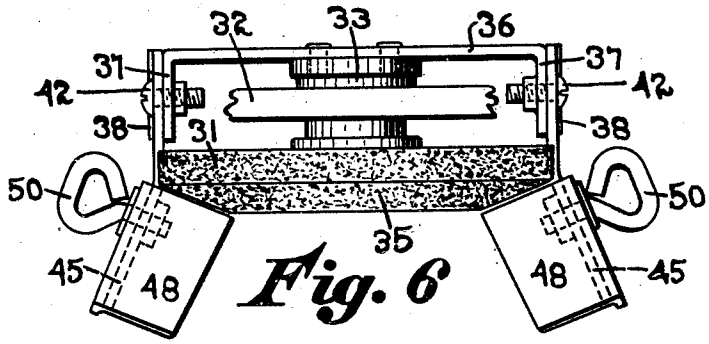


Fig. 6

Fig. 8

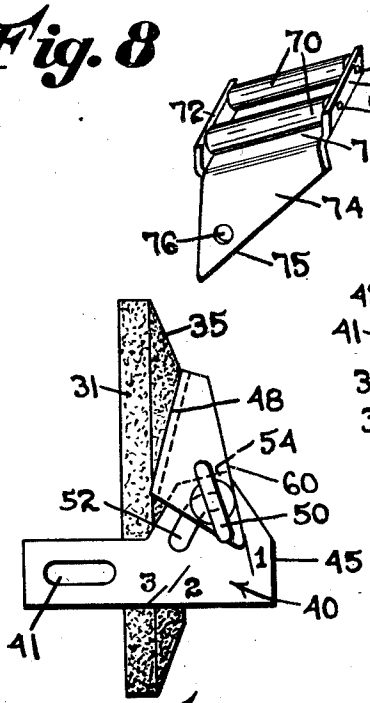


Fig. 7

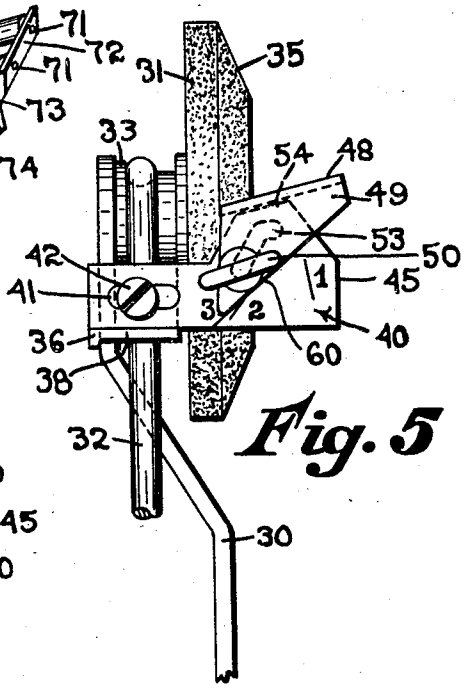


Fig. 5

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UNITED STATES PATENT OFFICE

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PORTABLE GRINDING MACHINE

Application filed April 30, 1928. Serial No. 273,891.

My invention relates to portable grinding machines and more particularly to a small grinding machine, adapted to be clamped to a table or bench, which is particularly serviceable for grinding the blades of shears, knives, chisels and the like; and this case is a continuation in part of my copending application Serial No. 149,583 filed November 20, 1926.

An edged tool will cut best if its beveled edge is always sharpened to a certain definite angle, which varies depending on the type of cutting operation required. A knife has a thin blade and the bevel is a very acute angle, while scissors have their cutting edges almost perpendicular to the sides. A cutting tool should, of course, be ground to a fine smooth edge and the angle of the bevel should always remain the same. If a chisel or a pair of scissors is sharpened manually on the ordinary hand stone, the user will not necessarily get the same angle on the edge or the same degree of sharpness each time, and the success of the operation will depend on how he manipulates the tool during the sharpening process. Such variations should, of course, be avoided; and there is a large demand for a type of sharpening tool which will produce the same type of cutting edge each time a given tool is sharpened.

Various types of portable grinding machine have been heretofore proposed for this purpose, but such tools have not been well suited for the general purposes of sharpening the numerous implements used in the home or the workshop. Certain types of cutting implements must be beveled on one side only and others should be given the same angular bevel on each side. It is therefore desirable that a portable grinding machine of this class be provided with work rests to hold the cutting tool to be sharpened at the proper angle relative to the grinding wheel. It is particularly desirable that the holder be so constructed that it may be readily and accurately adjusted from one position to another, so that a person unskilled in grinding tools may successfully sharpen many types of tools without undue trouble and, especially, be able to adjust the work rest at any time to duplicate a given bevel on the tool.

It is accordingly the primary object of this invention to provide a portable grinding machine which is simple in its construction and may be easily manufactured and which may be used by anyone, without requiring a large degree of skill, for the purpose of properly sharpening cutlery and for duplicating the results repeatedly.

A further object of this invention is to provide a portable grinding machine with a work rest which may be angularly adjusted easily to produce a desired bevel on the work, which may be adjusted towards the wheel as the grinding stone wears away without affecting the angular position of the work rest, and which may be accurately changed from one position to another to accommodate different types of work.

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

Referring to the drawings which illustrate certain embodiments of this invention and in which like reference numerals indicate like parts:

Fig. 1 is a side elevation of a single form of grinding machine embodying this invention;

Fig. 2 is a rear elevation partly broken away showing the arrangement of the work guiding rests when set for grinding knives having the same bevels on opposite sides;

Fig. 3 is a top plan view of the blade rest and grinding wheel, with other parts removed to show the relative positions of the rests and wheel when used for grinding knives;

Fig. 4 is a fragmentary detail showing the arrangement of guide rests and wheel corresponding with the views shown in Figs. 2 and 3;

Fig. 5 is a side elevation, partly broken away, showing a modification in which the movable work rest is provided with a guide member coordinating with indicating marks on its support which make it possible to move

the rest to exactly the same position repeatedly;

Fig. 6 is a fragmentary top plan view of the machine, but with parts removed;

Fig. 7 is a fragmentary detail view showing the work rest in a knife grinding position; and

Fig. 8 is a perspective view of a modified type of work rest.

In accordance with my invention, I provide a portable grinding machine for sharpening knives and for other useful purposes which comprises a frame 1 made, in the embodiment shown, of a metal casting shaped as illustrated in Fig. 1 to form a support for the grinding wheel as well as a driving member connected thereto. The frame is provided with lugs 2 and 3 extending rearwardly therefrom which form a clamping jaw, and cooperating therewith is a thumb screw 4 threaded through the lug 3 and adapted to engage the under side of a bench or table and thus clamp the frame thereon. The upper end 1*a* of the frame is preferably bent forwardly so that the driving wheel may be located on one side and the grinding wheel spindle on the other side and the two suitably connected by a belt therebetween.

Adjacent to the upper end of this frame 1 is fixed a horizontal stud 5 projecting rearwardly therefrom, and on this is mounted a rotary spindle 6 which is adapted to support a grinding wheel. The spindle has a flange 6*a* forming a shoulder against which the flat front face of the grinding wheel 7 is clamped. This wheel is fastened on the spindle in a suitable manner, as by means of a nut 6*b* threaded upon the end of the spindle.

The grinding wheel 7 may be constructed of suitable material, such as abrasive grains of crystalline alumina or silicon carbide bonded by a suitable bond, such as a vitrified ceramic material, and it may be made in accordance with well-known processes. The face of the wheel toward the frame 1 is preferably flat, and the other side is provided with a beveled portion 8 which is shaped like the frustum of a cone, this portion 8 being arranged at a suitable angle so that a knife ground thereon will clear the work rests and other parts of the frame as it is being ground. This shape is such that, as the grinding wheel wears away, the size of the wheel will not change, hence the diameter and the curvature of the grinding face is not affected by use of the wheel.

In order to support work in operative relation to this beveled grinding face a work rest is provided, and herein lies a main feature of this invention. For this purpose I provide a rearwardly projecting arm 10 which is slotted in a direction parallel to the axis of the grinding wheel, and to this slotted arm is secured an upright member or post 11 by means of a clamping bolt 9 passing through the slot 10*a* in the arm. These parts are so arranged that the post 11 may be adjusted toward and from the grinder to position the work rest properly relative thereto. The post 11 has a shoulder projecting over and riding on the top of the arm 10 to hold it in a vertical position.

It is desirable that there be two work rests, one on each side of the center of the wheel, in order that one may grind opposite sides of a piece of work or portions that require either left-handed or right-handed grinding, it being generally necessary to turn the wheel in such a direction that the operative face of the wheel travels upwardly against the edge and in such a manner as not to wedge the cutting tool between it and the supporting rest. For this purpose, I provide a bracket 12 fastened to the post 11, which projects laterally on each side of the axis of the wheel. Since the operative face of the wheel is beveled and it is desired that the work rests be parallel therewith, the ends of the bracket 12 are bent to form obliquely disposed forwardly projecting wings 13 to which are secured the work rests.

The work rests 14 in the form shown in Figs. 1 to 4 inclusive are made of angle irons having a work rest or guide arm 14*a* and a supporting flange which lies flat against the wing 13 and is adjustably bolted thereto by means of a thumb screw 15 and a clamping nut 15*a* thereon. These parts may, if desired, be made of pressed steel. Since the wings 13 of the bracket extend at substantially right angles to the face of the grinding wheel and the two wings of the angle iron 14 forming the work rest are at right angles to each other, the work rest is capable of angular adjustment from a position substantially parallel with the operative face of the grinding wheel to one which is substantially at right angles thereto, thereby permitting a wide range of adjustments so that one may sharpen many kinds of tools.

It is desirable that the edges of the various kinds of tools being ground contact with the grinding wheel at about the same position. That is, a knife and a scissors blade should each touch the grinding wheel at about the same place and this may be approximately on a horizontal diameter or in certain cases slightly below.

It can be appreciated that if the work rest is tilted from the knife grinding position shown in Fig. 4 to one in which the rest is substantially at right angles to the operative face of the wheel, the lower edge of the rest adjacent to the wheel will not remain in the same position as it is moved but it will be raised. A special feature of this invention involves so constructing and arranging the parts that as the work rest is tilted from one position to another, the cutting edge of the tool will remain in substantially the same

place on the grinding wheel. To that end, I provide a slot 13*a* for the thumb screw 15 which is so shaped and arranged that the work supporting shelf 14*a* of the work rest may be moved up and down relative to the grinding wheel axis as it is tilted. This slot 13*a* is oblique to a horizontal plane and is illustrated as being at an angle of about forty-five degrees thereto; and the upper portion of this slot is offset to form a recess in which the thumb screw 15 may be located so as to provide a fixed pivot about which the shelf may be revolved, for small angular adjustments to accommodate different types of knives to be ground.

In order that the grinding wheel may be driven, a horizontal stud 18 is mounted on the lower end of the frame, and on this stud is rotatably mounted the hub 19 of a driving wheel 20 which may be rotated by means of the handle 21. This wheel is connected to the spindle 6 by means of a belt 22 which in the present case is made of rubber or other flexible material, the spindle and wheel being suitably grooved to hold the belt in position. It will be observed that the centers of the grinding wheel and the driving wheel are a considerable distance apart, so that when the handle 21 is in its uppermost position it is still far enough from the cutting tool so as not to endanger the operator as he turns the wheel. It will be apparent that I may provide an intermediate gear between the driving wheel 20 and the spindle 6 to effect the same purpose.

In accordance with this construction it is feasible to adjust the post 11 towards and from the wheel so that the work rest 14*a*, when in the position shown in the drawings, may be adjusted properly to hold a knife blade in contact with the grinding wheel. The slot 13*a* is so shaped and arranged that after the work rest 14*a* has been properly positioned for grinding a knife blade, it may be then swung down to the position required for grinding scissors and the like by moving the thumb screw 15 downwardly in the slot 13*a*. This slot slopes downwardly towards the wheel so as to move the work rest 14*a* inwardly as it is turned about the screw 15. Otherwise, the lower edge of the rest 14*a* would move away from the wheel when it rotates upwardly and to the right, as seen in Fig. 4. By means of this construction, it is possible to keep the lower edge of the work rest positioned sufficiently close to the operative face of the grinding wheel so that no adjustment of the post 11 in the slot 10*a* is required. The only time that adjustment of this post is necessary is when the grinding wheel has worn away sufficiently to require moving the rest 14*a* more closely thereto.

A further feature of the invention involves provisions for moving the work rest from one position to another accurately and easily and without special attention on the part of the operator of the machine, whereby one may change from the position required to grind a knife to that required to grind shears or scissors, for example. A modification of the machine which is particularly adapted for this is shown in Figs. 5 to 7 inclusive.

As there illustrated, the frame 30 of the machine may be the same as shown in Fig. 1 and the grinding wheel 31 may be similarly mounted and driven by suitable means such as a motor or a hand driven wheel. In the present case, the resilient or other type of belt 32 passing over the grooved pulley on the spindle 33 may be driven by a hand wheel, as shown in Fig. 1. It will be understood that the frame is bent, as shown in Fig. 1, to align the pulleys and provide a direct run for the belt. In order to support the edged tool in proper relation to the beveled face 35 of the grinding wheel, a bracket 36 is suitably fastened at its center to the frame 30 and this extends at right angles to the axis of the wheel to points each side of and beyond the periphery of the wheel. The inwardly turned arms 37 of this bracket are at substantially right angles thereto and these are each provided with a projecting lug 38 adapted to hold rigidly in position an adjustable arm or support 40 for the tool rest.

This support 40 is provided with an elongated slot 41 through which passes a screw 42, threaded into the arms 37 on each end of the bracket. The lower edge of the arm 40 is parallel with and in contact with the upper surface of a projecting lug 38 so arranged that this lug, in conjunction with the screw 42, properly locates the arm and holds it rigidly in position at right angles to the bracket and in a horizontal position parallel with the axis of the grinding wheel. This arm, as will be apparent, is adjustable parallel with the wheel axis. The outer end 45 of the arm 40 is bent at such an angle that it will be at substantially right angles to a radial line in the adjacent beveled face of the grinding wheel so that the work supported on the rest may properly contact with the wheel.

The work rest, which is adjustably mounted on the arm 40, is formed, as shown in Figs. 5 to 7, of an angle iron having a plane topped plate 48 adapted to serve as the work support and a side piece 49 adapted to be pivotally mounted on and clamped against the side face of the arm 40. To this end, a clamping screw 50 passes through a hole in the arm 49 and is adjustably and pivotally mounted in the slot 52 in the extension 45 of the arm 40 and secured in place by a nut. As will be observed, this slot is arranged at an angle to a vertical line and its upper portion has a recess 53.

The top 54 of the arm 40 is inclined at a slight angle to the horizontal so that when the work guide or supporting plate 48 is

moved downwardly, the under side of the plate 48 will rest on the top 54 of the arm and so position it accurately at a definite angle relative to the wheel face. This angle is preferably that which is best suited for grinding the ordinary shears and scissors. This top edge 54 therefore constitutes a stop which limits the movement of the rest in one direction, and correctly locates it for grinding one type of work.

A knife or other thin bladed tool requires that its two sides be ground at a very acute angle to each other. For this purpose it is necessary that the work guide be tilted upwardly into the position shown in Fig. 7, and in order to insure having the guides properly positioned for this purpose, I provide an indicating device which will definitely locate the work support always in the same position for grinding tools of the same type. To this end, the edge 60 of the work supporting angle iron has a straight edged portion adapted to be positioned in line with certain marks, labelled on Figs. 5 and 7 as 1, 2 and 3, which are made on the bracket arm 40. When this straight edge is opposite the mark labelled No. 1 then the tool is in proper position for grinding knives. When the edge coincides with mark No. 3, the rest is in proper position, as shown in Fig. 5, for grinding shears.

In order to adjust the various parts so far described, the work rest is positioned as shown in Fig. 7 with the indicating mark No. 1 coinciding with the edge 60. This brings the lower edge of the table 48 closely adjacent to the operative face of the grinding wheel such that when a knife to be sharpened is placed thereon and the wheel is turned upwardly against the edge of the knife, it will be held in proper position for grinding. At this time, the clamping screw 50 is located in the recess 53 of the slot. While the screw 50 is in this recess, the table 48 may be tilted slightly to various positions adjacent to that shown in Fig. 7 without materially changing the lower position of the table, so that one may change the bevel on the knife being ground without shifting the axis of the work support from its pivotal position.

If the work rest is too far from or too close to the wheel, the screw 42 is loosened and the whole arm 40 is moved to effect the proper positioning of the lower edge of the table 48 relative to the wheel. When this has been effected the screw 42 is set in that position and no further adjustment will be required until the wheel face has worn away sufficiently to necessitate moving the guide rest more closely to it, this being the case irrespective of the angular adjustment of the work rest.

The slot 52 is arranged at such an angle that when the work table 48 is tilted from the position shown in Fig. 7 to the position shown in Fig. 5 and the clamping bolt 50 is moved down the slot to the lower end thereof, or until the under side of the table rests on the stop 54 of the arm, then the lower edge of the table is still close to the grinding wheel face and in proper position for holding a scissor blade thereon. Hence, all that is necessary to change the work rest from the position required for grinding knives to that required for grinding scissors is to loosen the clamping screw 50 and move it out of the recess 53 and down the slot until the under side of the table 48 contacts with the stop 54 and rests thereon. Then the clamping screw 50 may be tightened. When in this position, the indicating edge 60 of the adjustable table will be found to coincide with mark 3 on the bracket arm.

The intermediate mark 2 merely represents another position for grinding tools of a different type and it will be understood that various scale marks may be placed on this arm for use as desired. When the wheel wears away slightly, the angular adjustment of the table need not be affected, as it is merely necessary to loosen the screw 42 and shift the whole guide arm 40 forwardly so as to move the table slightly closer to the wheel.

A modified form of work rest is shown in Fig. 8, in which the work is supported by means of one or more freely rotatable rollers 70 mounted on pins 71 projecting through the upright flanges 72 of the plate 73 forming the top of an angle iron 74. The lower portion of this member has the straight edge 75 corresponding with the edge 60 in Figs. 5 and 7 and the rest may be mounted on a pin which passes through the hole 76, the same as is shown in the other figures. The rollers are arranged as shown with their axes at right angles to the path of travel of the cutting tool being ground. In this construction, a knife may be drawn across the rollers without danger of scratching the surface thereof as might be the case where a flat plate is used for the work rest, the surface of the roll frictionally engaging the knife blade and so causing the roll to rotate as the knife is moved back and forth.

The operation of this device has been fully set forth in the above description. It will be apparent that I have, by this construction, provided a grinding machine of the portable type which may be used in the home or on the farm, or in the machine shop to sharpen ordinary tools without requiring any great degree of skill on the part of the operator. He merely observes certain rules relating to setting the work rest, and takes due caution to hold the tool properly on the guide or shelf in contact with the wheel as it is rotated upwardly against the cutting edge. He will find that all tools of the same type are provided with duplicate beveled edges and that he can thereby keep them sharp without any great amount of skill being required on his

part. Further useful features will be apparent to those who are skilled in this art.

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

1. A portable grinding machine comprising a frame, a rotatable grinding wheel having an annular abrading face at an acute angle to the wheel axis, two guiding work rests, one on each side of the wheel axis and close to said annular face, supports for the rests permitting angular adjustment to hold various types of cutting tools in grinding contact with the wheel face on opposite sides of its center, and means on the frame for moving the rests parallel with themselves, so that after the rests have been located correctly for grinding similar articles they may be moved towards and from the wheel without disturbing the angular arrangements thereof.

2. A portable grinding machine comprising a frame, a grinding wheel rotatably mounted thereon, means for rotating the grinding wheel, a bracket mounted on said frame and having a slot arranged at an acute angle to a horizontal line, a work rest adapted to support a cutting tool close to the operative face of the grinding wheel, and a pivot for the rest movable in said slot, the parts being so arranged and the slot so shaped that the cutting edge of a tool on the rest will contact with the grinding wheel at substantially the same position irrespective of the angular tilt of the work rest.

3. A portable grinding machine comprising a frame, a grinding wheel rotatably mounted thereon, means for rotating the grinding wheel, a bracket mounted on said frame and having a slot arranged at an acute angle to a horizontal line, a work rest adapted to support a cutting tool close to the operative face of the grinding wheel and a pivot for the rest movable in said slot, the parts being so arranged and the slot so shaped that the cutting edge of a tool on the rest will contact with the grinding wheel at substantially the same position irrespective of the angular tilt of the work rest and means whereby the bracket may be adjusted towards and from the wheel without disturbing the angular adjustment of the rest.

4. A portable grinding machine comprising a frame, a grinding wheel rotatably mounted thereon, means on the frame for rotating the wheel, a work rest, a support therefor, said support and rest having a slot and pin connection so arranged that the rest may be angularly adjusted and moved towards and from the wheel, and means for indicating the correct positions of the rest for various types of work, said slot being so arranged that the rest may be angularly adjusted and moved to various indicated positions in which it is substantially the same distance from the wheel.

5. A portable grinding machine comprising a frame, a grinding wheel rotatably mounted thereon, two work rests located on opposite sides of the wheel axis and adjacent to the operative side face of the wheel, means including a support whereby each rest may be angularly adjusted cooperating parts on the rests and the support indicating when the rests have been adjusted to the same angle relative to the wheel face and means associated therewith for adjusting the two rests parallel with themselves without disturbing their angular arrangement.

6. A portable grinding machine comprising a frame, a grinding wheel having a side face for grinding, means on the frame for rotating said wheel, a support adjustable on said frame in a direction substantially parallel with the wheel axis, and a work rest pivotally and slidably mounted on said support, said guide and support having cooperating indicating parts which permit the rest to be angularly adjusted to a predetermined position relative to the wheel face, and a stop associated with said parts so arranged that when the rest has been adjusted for grinding one type of work it may be moved to a new position determined by said stop without requiring adjustment of the distance of the rest from the wheel.

7. A portable grinding machine comprising a frame, a rotatable grinding wheel mounted on the frame, means on the frame for rotating said wheel, a work guiding and supporting rest, a support therefor mounted on the frame for movement parallel with the wheel axis, means including a slot and a cooperating pin on the rest and support which permits the rest to be adjusted pivotally relative to the wheel face or to be moved to various positions towards and from the wheel face, and cooperating indicating marks on said rest and support which permit the rest to be set in various of predetermined angular arrangements relative to the wheel face.

8. A portable grinder comprising a frame a grinding wheel rotatably mounted thereon, means for rotating said wheel, a work rest, a support therefor adjustably mounted on the frame to move the rest towards and from the side face of the wheel, said support having a slot at an acute angle to a horizontal line and a horizontal recess, a pin movable in the slot which pivotally supports the rest, the horizontal recess serving to hold the pin for angularly adjusting the rest, and the sloping portion of the slot serving for adjustment of the rest vertically and horizontally, and means including indicating marks and coordinating parts on the support and the rest so arranged that the shelf may be set at a definite angular arrangement relative to the operative face of the wheel.

9. A portable grinding machine comprising a narrow frame member, a driving pulley rotatably mounted near one end of the frame with its axis at right angles thereto, a grinding wheel spindle having a pulley thereon mounted on the opposite side and at the other end of said frame, said frame being shaped to align the pulley with the driving wheel, a belt connecting said pulley and wheel to rotate the grinding wheel, a support carried on the frame and projecting on opposite sides of the grinding wheel, and an adjustable work rest on each end of said support arranged to support cutlery adjacent to the side face of the wheel on each side of the axis thereof.

10. A portable grinding machine comprising a frame, a grinding wheel rotatably mounted thereon, means on the frame for rotating the wheel, a work rest, a support for the rest having a slot, and a clamping member slidable in said slot which holds the rest in an adjusted angular position, said slot being so shaped and arranged that when said member is moved along the slot the rest may be adjusted to a new angular position without materially changing its distance from the grinding wheel and its location relative to the line of cutting action.

11. A portable grinding machine comprising a frame, a grinding wheel rotatably mounted thereon, means on the frame for rotating the wheel, a work rest, a support for the rest having a slot, means whereby the support may be adjusted to move the rest towards and from the wheel, a clamping member slidable in the slot which pivotally holds the rest in an adjusted angular position, and means indicating two grinding positions for the rest, said slot being inclined at an angle to a horizontal plane and having two limiting positions which serve to so locate said clamping member that when the rest is in either of the indicated grinding positions, it will be at approximately the same distance from the wheel and will hold the work in substantially the same position relative to the line of cutting action.

Signed at Worcester, Massachusetts this 26th day of March, 1928.

WILLIAM J. IRWIN.