My invention relates in general to improvements in the art of dressing or finishing cylindrical machine elements, and relates more specifically to improvements in the construction and operation of portable grinders for locomotive crank pins or the like.

Generally defined, an object of my invention is to provide an improved pin grinder for locomotive driving crank pins or the like, which is simple and durable in construction, and which is also readily manipulable and highly efficient in use.

The driving crank pins for locomotives, especially in the mountain districts, are subject to rather rapid wear and must therefore be dressed from time to time in order to cooperate properly with the connecting rods. Since these pins are firmly attached to the heavy and massive drive wheels, and the latter are likewise firmly attached to the axles, it would be an extremely tedious and prolonged task to even attempt to remove the crank pins for re-dressing in a lathe or stationary grinder, and such procedure would be highly objectionable and far too costly because it would keep the locomotives inactive for too long a period of time. This work must therefore be accurately accomplished as quickly as possible, and without necessity of removing either the pins or the wheels. While various types of tools have heretofore been used for the purpose of dressing locomotive crank pins, including portable crank-pin turning machines which are adapted to be attached directly to the pins and suspended therefrom during the cutting operation, these prior devices are all objectionable either because they are too slow in action, they lack necessary accuracy in performance, they are too awkward and difficult to operate, or they are too costly.

It is therefore a more specific object of my invention to provide a new and useful portable grinder especially adapted to re-finish worn locomotive crank pins, and which may be suspended directly from the pin ends during the grinding operation, thereby avoiding necessity of disturbing the locomotive assemblage except for removal of the connecting rods which normally coat with the worn pins.

Another specific object of this invention is to provide an extremely simple and relatively inexpensive portable grinder assemblage which can be quickly applied to and detached from a crank pin or the like, and which requires no high degree of skill for operation.

A further specific object of my present invention is to provide an improved crank pin dressing or finishing machine which is adapted for effective cooperation with pins of various sizes and types, and which may be conveniently suspended from various styles of crank pins.

Still another specific object of the invention is to provide an improved portable pin grinder which meets all requirements of railroad maintenance as to low cost, time saving, labor saving, and accuracy, and which may be utilized to grind diverse circular pins and bored holes, such as crank pins, trailer journals, car journals, connecting rod bores, cylinder head seats, or the like.

An additional specific object of this invention is to provide an improved revolving grinder which is revolving about and movable along the central axis of the cylindrical surface being ground, and which may be quickly and accurately adjusted to vary the cut.

Another specific object of the present invention is to provide a sturdy portable grinder unit which may be manufactured and sold at relatively moderate cost, and which is adapted for many different uses.

These and other specific objects and advantages of my invention will be apparent from the following detailed description.

A clear conception of embodiments of the various features constituting my present invention, and of the mode of constructing and of utilizing crank pin grinders built in accordance with the improvement, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a perspective view of one of the improved portable crank pin grinders, showing the same suspended from a locomotive driving crank pin and ready for operation;

Fig. 2 is an enlarged central longitudinal section through one of the portable grinders, showing the mechanism for suspending the unit from one type of crank pin;

Fig. 3 is a transverse cross-section through the portable grinder of Fig. 2, taken along the line 3—3;

Fig. 4 is a similar transverse cross-section taken through the portable grinder of Fig. 2, the section being taken along the line 4—4;

Fig. 5 is a fragmentary side view of the mechanism for operatively connecting the grinding wheel carrier to the feed screw, showing the mechanism in active position;
Fig. 6 is a transverse section through the mechanism of Fig. 5, taken along the line 6–6; Fig. 7 is a fragmentary side view similar to that of Fig. 5, but showing the connecting mechanism in inactive position.

Fig. 8 is a fragmentary central longitudinal section through a portion of the grinding assembly, showing the mode of attaching the same to a crank pin of a type different from that shown in Fig. 2; and Fig. 9 is another fragmentary central longitudinal section through a similar portion of the grinder assembly, showing the mode of attaching the same to still another type of crank pin.

While I have shown and specifically described the invention as being especially applicable for the purpose of dressing various types of locomotive crank pins, it is not the intent to thereby unnecessarily restrict the scope or utility of the improvement, and the assembly may and has been used for diverse other purposes such as grinding trailer and car journals, and bored holes. The term "crank pin" as used herein should therefore be given the broadest possible interpretation; and while the grinding units of the assembly specifically illustrated herein are operable by rotary compressed-air driven motors, these may also be replaced by electric motor driven units or the like.

Referring to the drawings, the improved assembly as illustrated in Fig. 1, is a machine which has been in successful commercial operation for some time, while the assemblies shown in Figs. 2 to 9 inclusive disclose somewhat refined details of construction, but the essential elements of the two assemblies while being slightly different in design, function the same and will be referred to with like reference characters.

The improved assembly comprises in general an elongated central shaft or having one end 11 screw threaded for either direct or indirect, but firm attachment to a crank pin 12, and having its opposite free end 13 provided with a suitable feed thread; an elongated tubular support 14 loosely embracing the shaft 10 between the threaded ends 11, 13, and one or more guide rods 21, 22 which may snugly engage the reduced outer end 16 of a crank pin 12, a sleeve member or drum 17 rotatably journaled upon the tubular support 14 by means of spaced roller bearings 18 which are formed to prevent relative axial shifting of the drum 17 and support 14; a ring or collar 19 revolvable with and slideable along the drum 17, and carrying diametrically opposite brackets 20 in which four parallel guide elements or rods 21, 22 are fixedly but adjustably supported; a steedring ring or plate 23 rigidly interconnecting the ends of the rods 21, 22, and being bored to fit the adjacent portion of the crank pin 12; air pressure operated grinder units 24 swingably and suspened from the diametrically opposite guiding rods 21 and having rotary grinding wheels 25 which are cooperative with the peripheral surfaces of the crank pin 12; mechanism including levers 26, threaded spindles 27 and cranks 28 for adjusting the grinding units 24 toward and away from the crank pin periphery about the axes of the guide rods 21, and a releasable clamp 29 and connecting rod 30 for attaching the grinder units 24 to the feed screw end 13 of the fixed shaft 10 through the collar 19 and guide rods 21, 22.

The crank pins 12, 12', 12'' may be of various types as shown in Figs. 2, 8 and 9, and the shaft 10 which should in each case be mounted approximately concentric with the crank pin axis, and be readily attachable to and detachable from the overhanging end of the pin 12, may be either attached directly to the pin end as in Fig. 2, or through adaptors as in Figs. 8 and 9. In Fig. 2, the crank pin 12 has a threaded socket with which the shaft end 11 directs to the crank pin 12, and the socket member 15 which snugly embraces the overhanging pin end 16, coacts with a flange 31 formed integral with the tubular support 14, and both the support 14 and socket member 15 are firmly clamped in position by means of a nut threaded on the shaft 10 and engaging an adjustable collar 33 threaded on the outer end of the tubular support 14. This assembly of parts, provides a rigid centralized support 14 firmly secured to and extending axially from the overhanging end of the crank pin 12, and the feed screw end 13 of the shaft 10 projects outwardly beyond the end of the support 14.

In Fig. 8, the crank pin 12' has no integral reduced overhanging end 16, and the shaft 10 and support 14 must be attached to the pin 12' in line with its axis, by means of a special adaptor comprising a spindle 34, a coupling sleeve 35, a spacer block 36, and a filler block 37. The spindle 34 has one end threaded for firm attachment to a central threaded socket in the pin 12', and the coupling sleeve 35 coacts with the opposite threaded end of the spindle 34 and with the threaded end 11 of the feed shaft 10, so as to provide a rigid support for the shaft 10 approximately in line with the crank pin axis. The spacer block 36 engages the end surface of the crank pin 12' and has an end projection fitting a bore in the filler block 37, and the latter is snugly embraces the spindle 34 and is snugly embraced by the socket member 15 which coacts with the flange 31 of the support 14. The support 14, flange 31, block 37 and block 38 are clamped against the pin 12' by a nut 32 as in Fig. 2.

In Fig. 9, the crank pin 12'' is hollow and has no threaded end socket disposed centrally thereof. There is however an eccentric end socket threaded to fit the grease injector, and I have provided a special adapter comprising a cap screw 39, a spacer sleeve 40 with a socket member 41, and a connecting block 42 for effecting central attachment of the shaft 10 and support 14 to such crank pins 12''. The adapter socket 39 of this assembly fits snugly within the central end recess of the pin 12'' and may be firmly confined within this recess by means of the eccentric cap screw 38. The socket 39 has internal screw threads formed concentric with the crank pin axis, and with which external screw threads on the block 48 coact, and this block 40 has a threaded socket adapted for reception of the shaft end 11. The alining socket member 41 coacts with the reduced pin end 16 and with the support flange 31, as previously described, and these parts may be clamped together by means of a nut 32, as in Fig. 1. The support 14 may be provided with an end projection 43 for the reception of this adapter, and additional special adapters may be provided for other types of crank pins.

The rotary member or drum 17 should be freely rotatable with minimum effort, about the central axis of the crank pin 12, and the support 14 of bearings 15 provide for such rotation. While the bearings 15 are in this form a smooth roller type, any suitable type of anti-friction bearing which will prevent displacement of the drum 17 along its axis, may be utilized. The collar 33 and nut 32 may be concealed within the end of the drum 17, but the interior of the
drum should not actually touch the collar 33 so that free rotation of the drum might be interfered with. The elongated collar or ring 19 is split as shown in Figs. 2 and 4, so that this ring 19 may be moved longitudinally of the drum 17, and may be adjusted to eliminate excessive clearance by means of the clamping screws 15. The collar 19 is provided with oppositely disposed recessed lugs 43 with which spacer blocks 44 coat, and the brackets 20 are rigidly attached to the split collar by means of bolts 45 piercing the blocks 44 and screwed into the lugs 43. Each bracket 20 holds the guide rods 21, 22 coat, and the brackets 20 are preferably rigidly interconnected by means of links 46 shown in Fig. 4, in order to maintain the guide rods 21, 22 in parallel position. The guide rods 21, 22 are also rigidly interconnected and maintained parallel to each other, by the end plate 23 which bears upon the crank pin 12 and is rotatable about the crank pin axis when the drum 17 is rotated and the rods 21, 22 are revolved.

The guide rods 21, 22 are rotatably adjustable with the brackets 20 and plate 23, and may be locked in adjusted position with the aid of set screws 47. Each of the rotary air pressure operated grinder units 24 is suspended from the adjacent guide rod 21 by means of a supporting bracket 48 as shown in Figs. 2 and 3, and may be adjusted along and around its suspension rod 21 and clamped in adjusted position with the aid of clamping screws 49. When the units 24 have been adjusted and clamped to the guide rods 21, they may be revolved and moved longitudinally with the rods to cause the grinding wheels 25 to revolve about and move along the crank pin 12. The units 24 may, however, be moved independently of each other, toward and away from the crank pin periphery, in order to vary the cut and as illustrated in dot-and-dash lines in Fig. 3, with the aid of the adjusting mechanism shown in Fig. 4. The levers 26 are rigidly attached to the grinder carrying rods 21, so that when the set screws 47 are released, swinging of the levers 26 will cause the rods 21 to rotate about their own axes relative to the centering bracket 27, by which the grinding spindles 27 are threaded for adjustment in pivot blocks 50 swivelled in the swinging ends of the levers 26, and coat with the other guide rods 22, so that when the cranks 28 are manipulated, the levers 26 will be swung about the axes of the rods 21 and will rotate these rods to thereby cause the grinding units 24 to swing about the rod axes toward or away from the crank pin 12, depending upon the direction of rotation of the cranks 28. This swinging adjustment of the grinder units provides a very fine and accurate adjusting means for varying the degree of grinding, by virtue of the length of the levers 26 and the fact that the lever movement can be readily controlled with the fine screw threads on the spindles 27, and quicker but less accurate adjustment of the units 24 is made possible with the aid of the clamping screws 49.

The grinder units are preferably of similar and interchangeable construction, and have rotary air or electric motors 51 which are adapted to be detachably clamped to the brackets 48 in any suitable manner, and the grinding wheels 52 are adapted to be driven at high speed by the motors 51. The wheels 25 may be provided with guards 52, and when air motors 51 are utilized, the compressed air may be admitted to the motors 51 through short flexible tubes 53 and a Y-pipe 54 connected to an air supply hose 55 by means of a swivel joint 56, see Fig. 1. This assemblage will permit the units 24 and their carriage to be slid along the drum 17 and revolved freely with the supporting collar 19 and drum 17 about the longitudinal axis of the crank pin 12 and support 14, and the Y-pipe 54 may be attached to the brackets 20, so that it will serve as a handle for sliding the collar 19 and for revolving the drum 17 and the associated parts.

The revolving structure including the collar 19 may be moved along the drum 17 and the crank pin axis either by hand, or at a uniform rate with the aid of the threaded shaft end 13. Such interchangeable operation is made possible by means of the releasable clamp 25 shown in Figs. 5 to 7 inclusive, and this clamp comprises the connecting rods 30 attached to the collar 18, and a pair of transverse bars or plates 57, 59 having screw threads cooperable with the shaft end 13, and which are secured to the ends of the rods 30. The plates 57, 59 are guided for movement toward and away from each other by pins 58 and are constantly urged apart by compression springs 60; and a cam lever 61 which is swingably suspended from a U-bolt 62 secured to the plate 57, is operable to bring the plates 57, 59 together and into operative coaction with the threaded shaft end 13 against the action of the springs 60. When the cam lever 61 is swung down as in Fig. 5, the internal screw threads of the plates 57, 59 are in engagement with the threads of the shaft end 13, and are therefore active in advancing the collar 19 and grinder units 24 at a uniform speed along the axis of the drum 17 and the crank pin 12, when the units 24 and drum 17 are revolved about this axis. When the cam lever 61 is swung up as in Fig. 7, the plates 57, 59 are released from engagement with the threaded shaft extension 13, and the collar 19 and grinder units 24 may then be moved freely along the crank pin axis at any desired and variable rate of speed. Either the rods 30 or the Y-pipe 54 may be utilized to manipulate the revolving and sliding structure of the machine. The crank pins 12, 12', 12" are normally rigidly attached to driving or driven wheels 63 or the like, and during operation of the locomotive, these crank pins have connecting rods coating therewith in a well known manner.

While the normal use of my improved crank pin grinder should be clearly apparent from the foregoing detailed description, a short resume thereof will be given. When a locomotive has been pulled into the round-house or repair shop, the connecting rods will first be removed from the worn crank pins 12, after which the improved grinder assemblage may be mounted upon a worn pin. Depending upon the type of crank pin to which the assemblage is to be applied, an adapter such as shown in Fig. 8 or in Fig. 9 may be used or the shaft 10 may be directly attached to a crank pin 12 such as shown in Fig. 2. After the shaft 10 has been properly attached to the crank pin, the support 14 with its associated elements may be applied to the shaft 10 and clamped in place by manipulation of the nut 32 and collar 33. The grinding wheels 25 may then be roughly adjusted and positioned by releasing the cap screws 49, and the collar 19 and rods 21, 22 may be positioned to place the wheels 25 within the zone of grinding, by releasing the cap screws 47 and shifting the collar 19 along the revolvable
drum 17. When the proper initial adjustment has been thus effected, the grinding wheels 25 may be adjusted toward or away from the crank pin periphery with the aid of the cranks 28 and the wheels 25 may be thus adjusted to make any desired depth of cut. The lever 54 may thereafter be manipulated to bring the clamp 29 into action, whereupon air may be admitted to the motors 51 through the supply pipe 55 to cause the grinding wheels 25 to revolve. The revolving wheels 25 coacting with the crank pin periphery will tend to cause the motors 51 and guide rods 21, 22 to revolve about the crank pin axis together with the collar 19 and this revolution of the parts will cause the screw threads on the shaft end 13 to gradually advance the collar 19 and the parts associated therewith along the revolving drum 17 and will thus advance the revolving wheels 25 along the periphery of the pin 12. The action of the grinding wheels 25 may be aided manually by utilizing the Y-pipe 54 or the rods 30 as handles, and the screw threads on the shaft end 13 will necessarily control the rate of lateral advancement of the wheels 25 along the crank pin axis, while the rate of revolution of the wheels about the pin axis will regulate the rate of grinding or movement of the wheels 25 about the crank pin. By releasing the clamp 29, the rate of advancement of the wheels 25 along the crank pin 12 may be materially increased, and when one surface of the pin has been finished, the collar 19 may be shifted to permit finishing of other portions of the crank pin.

It will thus be apparent that my invention provides an improved grinding assemblage which will permit rapid and accurate dressing of worn crank pins, without removing the pins from their driving wheels 63 or other supports. The revolving drum 17 by virtue of its mounting on antifriction bearings 55, may be freely rotated about the crank pin axis, and the collar 19 which is rotatable with the drum 17 about this axis, is also freely slidable along the drum so as to shift the wheels 25 along the cylindrical crank pin surface. The ring 23 cooperates with the brackets 20 to maintain the guide rods 21, 22 in parallel position, so that the axes of rotation of the grinding wheels will always remain parallel to the central axis of the crank pin. The adjusting mechanism for revolving the grinder units 24 about the axes of their suspension rods 21, permits very fine and accurate adjustment of the positions of the wheels, and it has been found that rotation of the wheels 25 during normal operation of the unit, automatically causes the collar 19 to move along the drum 17 due to the action of the clutch 28 with the screw threads of the shaft end 13. The assemblage may also be readily adjusted so as to cooperate with cylindrical surfaces of various lengths and diameters, and because of the fact that the improved grinding mechanism is supported solely by the crank pin 12 which is being ground, the unit may be readily centralized with the supporting pin 12. The improved grinding unit has proven highly successful in actual commercial use in locomotive repair shops and it has been found that crank pins may be accurately refinished with minimum delay in use of the locomotives. The entire assemblage is obviously a useful one, at moderate cost, is highly flexible in use, and may be manipulated by a novice.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of use, herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

I claim:

1. In combination, a feed shaft attachable to the overhanging end of a crank pin, a tubular support embracing said shaft and having a socket embracing the crank pin end, said shaft having a threaded extension projecting beyond the overhanging end of said support, a rotary drum journaled on said support, brackets suspended from said drum, guide rods carried by said brackets and extending parallel to the axis of rotation of said drum, grinder units suspended from said guide rods on opposite sides of the crank pin and being slidable along said drum, means for effecting adjustment of said units relative to the axes of said guide rods to move the grinding portions of said units toward or away from the crank pin periphery, and means cooperative with said threaded shaft extension to move said grinder units longitudinally of the crank pin axis.

2. In combination, an elongated support attachable to the overhanging end of a crank pin in axial alignment therewith, a rotary drum journaled on said support and being fixed against axial displacement, guide rods carried by said drum and being revolvable about the drum axis and freely slideable along the drum, grinder units suspended from said guide rods on opposite sides of the crank pin and being slidable along said drum, means for effecting adjustment of said units about the axes of said guide rods to move the grinding portions of said units toward and away from the crank pin periphery, and means for coacting with said guide rods independently of said drum for effecting uniform movement of said grinder units longitudinally of the drum axis and of the crank pin when said guide rods are rotated.

3. In combination, an elongated support attachable to the overhanging end of a crank pin, a drum rotatable upon said support and being fixed against axial displacement, a guide rod carried by said drum and being revolvable about the drum axis during rotation of said drum, a grinder unit revolvable with and freely slideable along said drum, means for effecting adjustment of said unit relative to said rod to move the grinding portion of said unit toward and away from the crank pin periphery, and means operable by the rotation of said drum and coacting with said rods independently of the drum to move said grinder unit along the drum and crank pin.

4. In combination, a support attachable to the overhanging end of a crank pin, a member freely rotatable upon said support about the crank pin axis but fixed against axial displacement and having a guide element slidable freely therealong and revolvable about said axis, a grinding wheel movorable along said axis with said guide element, means for effecting adjustment of said wheel toward and away from the crank pin periphery, and means operable by the rotation of said member and coacting with said element independently of the member for moving said grinding wheel along said rotatable member.

5. In combination, a support attachable to the overhanging end of a crank pin, a member rotatable about the crank pin axis and having a guide element slidable directly thereon and therealong and revolvable about said axis, an anti-friction bearing between said support and said member,
a grinding wheel movable with said guide element, and means operable by the rotation of said member to move said element independently of the member for advancing said wheel along the crank pin at a uniform rate.

6. In combination, a support attachable to the overhanging end of a crank pin, a member rotatable about the crank pin axis and having a guide element slidably supported thereon and revolvable about said axis, an anti-friction bearing between said support and said member, a grinding wheel movable with said guide element, means for effecting adjustment of said wheel toward and away from the crank pin periphery, and means operable by the rotation of said member and coating with said element independently of the member for advancing said wheel along the crank pin at a uniform rate.

7. In combination, a support, means for effecting interchangeable attachment of said support to the overhanging ends of crank pins of different types, a smooth cylindrical drum member rotatable upon said support and having a guide element slidably directly therein parallel to and revolvable about the crank pin axis, a grinding wheel movable with said guide element, and means operable by the rotation of said member and coating with said element independently of the drum member for advancing said wheel along the crank pin at a uniform rate.

8. In combination, a support, means for effecting interchangeable attachment of said support to the overhanging ends of crank pins of different types, a smooth cylindrical drum member rotatable upon said support and having a guide element slidably directly therein parallel to and revolvable about the crank pin axis, a grinding wheel movable with said guide element, means for effecting adjustment of said wheel toward and away from the crank pin periphery, and means operable by the rotation of said member and coating directly with said element for advancing said wheel along the crank pin at a uniform rate.

9. In combination, a support attachable to an end of a crank pin, a member rotatable about the crank pin axis but fixed against axial displacement and having diametrically opposite guiding elements slidably supported thereon and revolvable about said axis, a grinding wheel movable along said axis with each of said guiding elements, said grinding wheels being disposed for peripheral engagement with the crank pin periphery on opposite sides of said axis, and means operable by the rotation of said wheels and coating directly with said guiding element for advancing the same longitudinally of said member and along the crank pin at a uniform rate.

10. In combination, a support attachable to an end of a crank pin, a member rotatable about the crank pin axis but fixed against axial displacement and having diametrically opposite guiding elements slidably supported thereon and revolvable about said axis, a grinding wheel movable along said axis with each of said guiding elements, said grinding wheels being disposed for peripheral engagement with the crank pin periphery on opposite sides of said axis, means for effecting adjustment of said grinding wheels toward and away from the crank pin periphery, and means operable by the rotation of said wheels and coating directly with said element for advancing said element longitudinally of said member and along the crank pin at a uniform rate.

11. In combination, a support formed for suspension from a crank pin in line with the crank pin axis, a drum rotatable upon said support and being fixed against movement along said axis, a collar rotatable with and slidably directly upon and along said drum, guide rods carried by said collar, and grinding units suspended from said guide rods and being revolvable with and movable along said drum.

12. In combination, a support formed for suspension from a crank pin in line with the crank pin axis, a drum rotatable upon said support and being fixed against movement along said axis, a collar rotatable with and slidably along said drum, guide rods carried by said collar, and grinding units suspended from said guide rods and being revolvable with and slidably directly upon and along said drum, said units being swingably adjustable about the axes of their suspension rods toward and away from said crank pin.

13. In combination, a support formed for suspension from a crank pin in line with the crank pin axis, a smooth cylindrical drum rotatable upon said support and being fixed against movement along said axis, anti-friction bearings interposed between said drum and said support, a collar rotatable with and slidably directly upon and along said drum, guide rods carried by said collar, and grinding units suspended from said guide rods and being revolvable with and movable along said drum.

14. In combination, a support formed for suspension from a crank pin in line with the crank pin axis, a smooth cylindrical drum rotatable upon said support and being fixed against movement along said axis, a collar rotatable with and slidably along said drum, guide rods carried by said collar, and grinding units suspended from said guide rods and being revolvable with and movable along said drum, means for effecting the movement of said collar and said units along said axis when said drum and collar are rotated.

15. In combination, a support formed for suspension from an object to be ground, a drum rotatable upon said support, means for preventing axial displacement of said drum, a guide element slidable upon and rotatable with said drum, grinding wheels carried by said guide element and being revolvable about the axis of said drum, and means operable by the grinding action of said wheels and coating directly with said element for advancing the same along said drum.

16. In combination, a support formed for suspension from an object to be ground and having a feed screw extending along its axis, a member rotatable about said axis but fixed against movement thereon, a guide element rotatable with and slidably upon said member, grinding wheels carried by said element, and means cooperating with said screw independently of said member to move said wheels and said element along said axis.

17. In combination, a support formed for suspension from an object to be ground and having a feed screw extending along its axis, a member rotatable about said axis but fixed against movement along said screw, a guide element rotatable with and slidably upon said member, grinding wheels carried by said element, means cooperating with said screw independently of said member to move said wheels and said element along said axis and said member, and means for...
18. In combination, a feed shaft attachable to a crank pin, a tubular support embracing said shaft and having a socket embracing the crank pin end, said shaft having a threaded portion extending beyond said support, a drum rotatable upon but fixed against movement along said support, a collar slidably along said drum, brackets suspended from said collar, guide rods carried by said brackets and extending along said drum, grinder units suspended from said rods on opposite sides of the crank pin and being slidable along said drum, and means cooperating with said threaded shaft extension to move said grinder units longitudinally of the crank pin axis and of said drum.

19. In combination, a tubular support attachable to the overhanging end of a crank pin and having a threaded extension projecting there beyond, a drum rotatable upon but fixed against movement along said support, a collar slidably along said drum and being rotatable therewith, a bracket suspended from said collar, a guide rod carried by said bracket and being revolvable about the axis of said drum, a grinder unit suspended from said guide rod and being slidable along said drum, and means directly connecting said guide rod and said threaded extension for moving said grinder unit longitudinally of the drum and crank pin axis during rotation of said drum.

20. In combination, a tubular support attachable to the overhanging end of a crank pin and having a threaded extension, a rotary drum journaled on said support, a collar slidably along said drum, brackets suspended from said collar, parallel guide rods carried by said brackets and extending along the axis of rotation of said drum, a grinder unit suspended from said rods and being slidable along said drum, means for effecting adjustment of said unit relative to the axis of said guide rods to move the grinding portion of said unit toward or away from the crank pin periphery, and means cooperating directly with said threaded extension and with said guide rods independently of said drum for moving said grinding unit longitudinally of the crank pin axis.

GEORGE FERDIEND PRILL.