

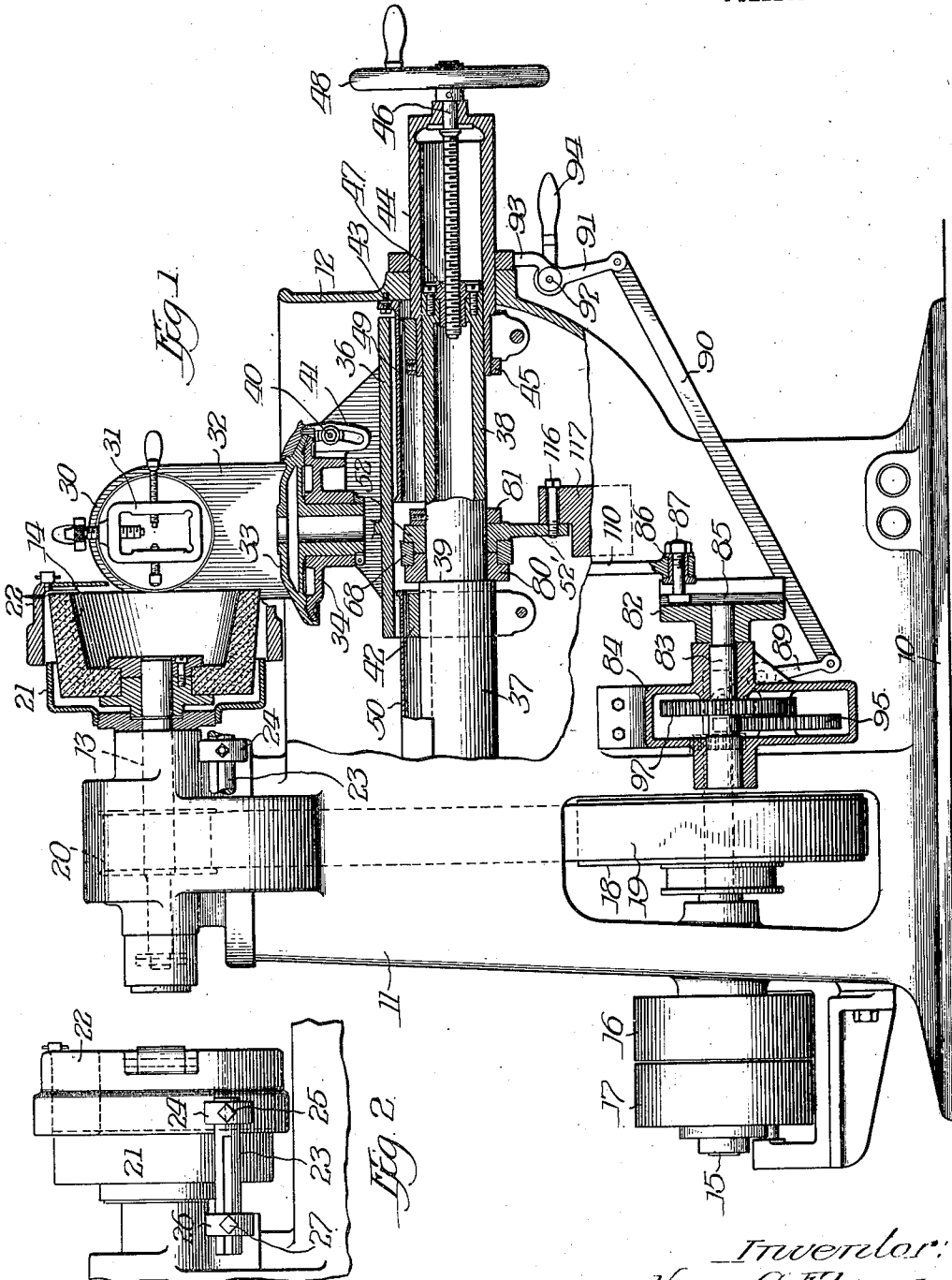
H. C. ELVERS.
TOOL GRINDER.

APPLICATION FILED JUNE 27, 1914.

Patented Dec. 22, 1914.

4 SHEETS-SHEET 1.

1,121,995.



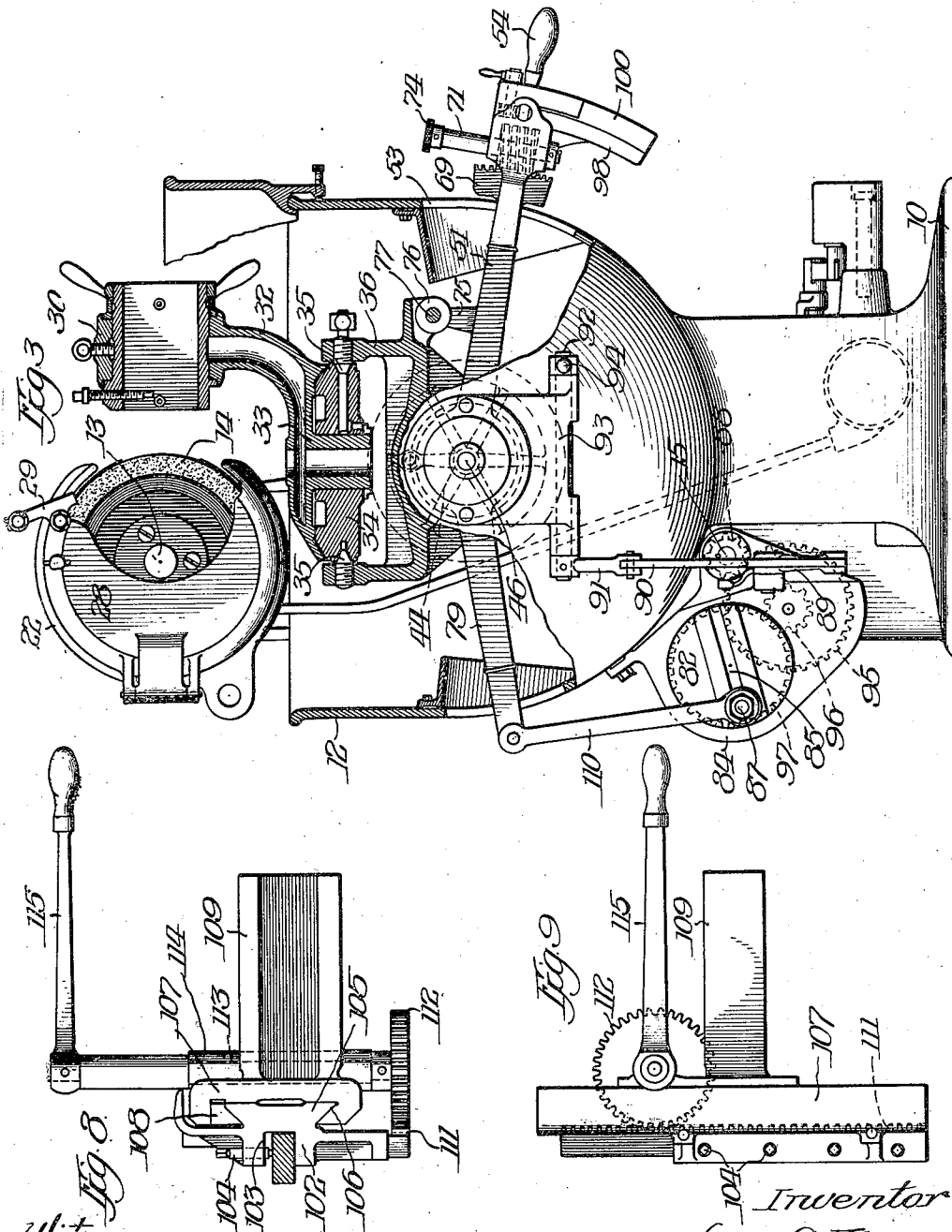
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4 SHEETS-SHEET 2.



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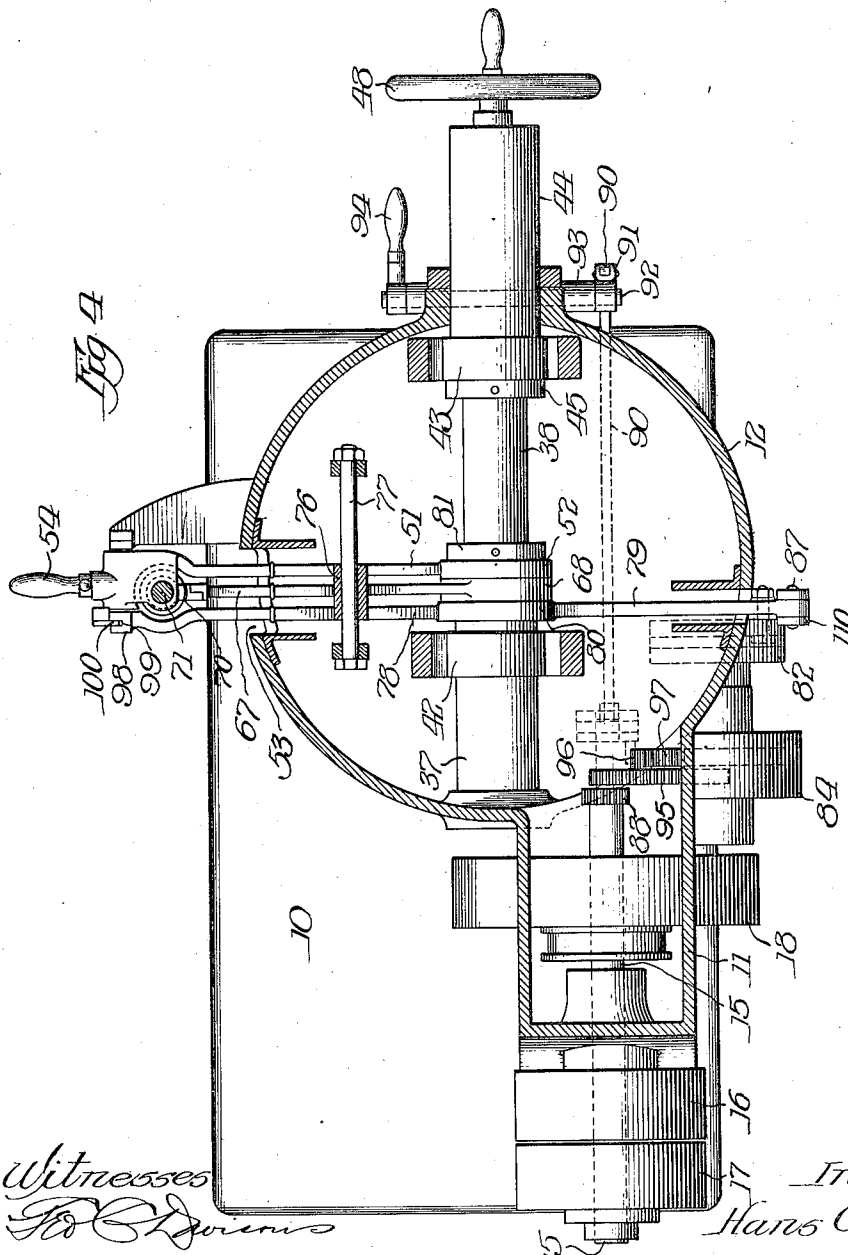
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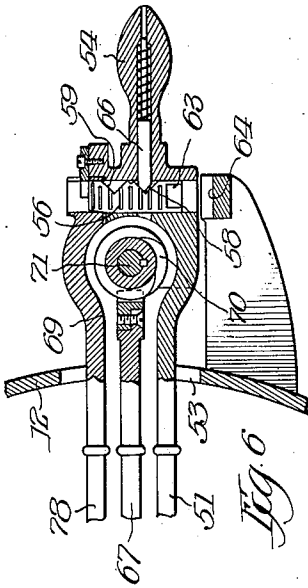


Fig. 6

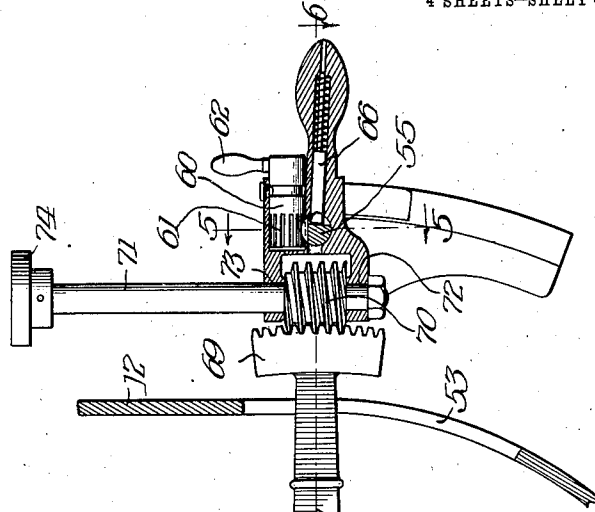
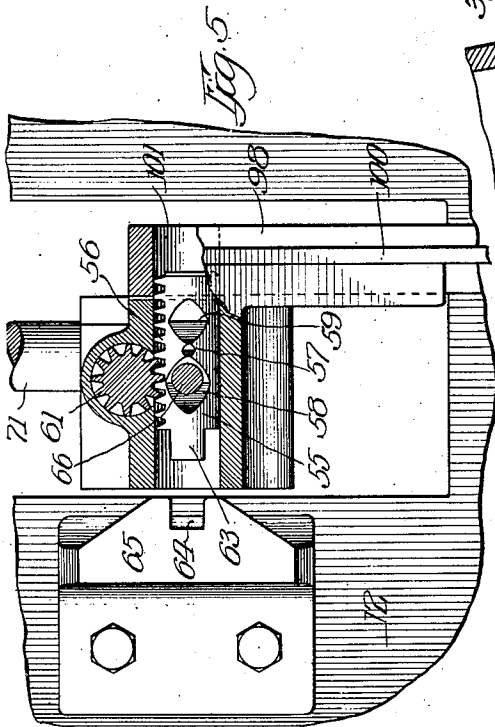


Fig. 7



UNITED STATES PATENT OFFICE.

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TOOL-GRINDER.

1,121,995.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HANS C. ELVERS, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Tool-Grinders, of which the following is a specification.

This invention relates to improvements in tool grinding machines, and has reference more particularly to improvements in that class of grinding machines that are adapted to sharpen metal working tools employed on lathes, boring mills and other machine shop tools.

Among the objects of the invention are, to improve the hood of the emery wheel by making it adjustable to the decreasing size of the emery wheel as the latter wears down, to provide a novel attachment for the tool holder to facilitate the grinding of broad facing cutters and which shall have an operating mechanism of its own adapted to be actuated when the regular tool holder is locked in a stationary position, to provide a novel one-piece or integral frame and basin or pan, to provide a novel means for locking the tool holder in stationary position when it is desired to grind flat or broad facing cutters by the attachment above referred to, to provide means for oscillating the tool holder either manually or by power across the face of the emery wheel, and to provide means for adjusting the position of a tool held in the tool holder with relation to the emery wheel in a direction at right angles to the horizontal pivotal axis of the tool holder support.

Other minor objects and advantages of the invention will be apparent from the following detailed description, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation, partly in vertical section, of the complete machine; Fig. 2 is a fragmentary side elevation illustrating the sectional and adjustable character of the hood of the emery wheel; Fig. 3 is a front elevation, partly in vertical section, of the complete machine; Fig. 4 is a horizontal section substantially in the plane of the stationary tubular arm on which the tool holder carriage is mounted for oscillation crosswise of the face of the emery wheel;

Fig. 5 is an enlarged detail view, partly in elevation and partly in vertical section, on the line 5—5 of Fig. 7, showing the means for locking the hand lever by which the tool holder is oscillated either to the frame of the machine or to a power operated lever; Fig. 6 is a detail view of the same mechanism in horizontal section on the line 6—6 of Fig. 7; Fig. 7 is a detail view of the same mechanism, partly in side elevation and partly in vertical section; Fig. 8 is an end elevation of the tool holder attachment for grinding broad facing cutters, and Fig. 9 is a top plan view of the attachment shown in Fig. 8.

Referring to the drawings, the frame of the machine is preferably formed in a single casting and comprises the base plate 10, a column 11 rising from the rear of the base plate, and a basin or pan 12 rising from the front portion of the base plate. In the upper end of the column 11 is suitably journaled a spindle 13, on one end of which is secured the usual cup-shaped emery wheel 14. In the lower portion of the column 11 is journaled a driving shaft 15 carrying fast and loose pulleys 16 and 17, and a transmission pulley 18 connected by a belt 19 extending through the hollow column 11 to a pulley 20 fast on the spindle 13.

Surrounding and inclosing the periphery and rear side of the emery wheel 14 is a two-part adjustable hood, the same comprising a stationary section 21 secured to the bearing block of the spindle 13 and covering the rear side and rear portion of the circumference of the emery wheel, and an adjustable section 22 covering the forward peripheral portion of the emery wheel and of sufficient diameter to telescope over the stationary section 21. The adjustable section 22 is supported by an arm 23 to which it is secured by a lug 24 and set screw 25, the rear end of said arm being adjustably mounted in a lug 26 on the side of the spindle bearing block and adjustably keyed by a set screw 27. To the forward edge of the adjustable hood section 22 is hinged the cover plate 28 which guards the working face of the emery wheel opposite that portion engaged by the tool in the grinding operation.

From the foregoing it will be apparent that, as the wheel wears down and shortens,

the hood section 22 can be adjusted rearwardly over the section 21 so as to make the total width of the hood conform at all times substantially to that of the emery wheel.

One advantage of this construction grows out of the fact that the water supply nozzle 29 is usually mounted on the forward edge of the hood, and by maintaining a substantially constant relation of the forward edge of the hood to the grinding edge of the wheel the water jet is most effectively directed upon the engaging surfaces of the wheel and the tool being ground thereby.

The tool holder comprises a hollow head 30 carrying an adjustable tool clamp 31 formed on the upper end of an upwardly curved neck 32, this latter being integral with a base plate 33 that is vertically journaled in a rocking plate 34 mounted on oppositely disposed cone bearings 35 in a saddle frame 36, which latter is mounted to oscillate upon a stationary hollow arm secured within the frame and basin of the machine. This hollow supporting arm comprises a rear portion 37 (Fig. 1) and a reduced portion 38, an annular shoulder 39 being formed on the junction of the two portions. The rocking plate 34 is secured in adjusted position by a clamp stud 40 (Fig. 1) entering one side of the saddle frame 36 and passing through a slotted segment bar 41 fast on the rocking plate 34. The saddle frame 36 is formed at its inner end with a split collar 42 that embraces the larger section 37 of the supporting arm, and it is formed at its forward end with a similar split collar 43 that embraces the reduced inner end of a tubular stem member 44 that is slidably mounted in a hole in the front slide of the basin 12 and itself is movable endwise on the reduced portion 38 of the hollow tool holder supporting arm. The bearing collar 43 is confined on the inner end of the stem member 44 by a nut 45. Journaled in the outer end of the stem member 44 is a shaft 46 having a threaded portion extending axially of the stem member 44 and engaging a nut 47 secured to the forward end of the tubular arm section 38. On the outer end of the shaft 46 is a hand wheel 48, by turning which the stem member 44 and the tool carrier connected thereto is adjusted to and fro from the grinding face of the emery wheel in the direction of the axis of the latter. Secured to the inner wall of the basin 12 are crescent-shaped shields 49 and 50 that extend through arc-shaped slots in the forward end and rear ends of the base plate of the saddle frame 36 and serve to protect the bearings 42 and 43 of the latter from the water and grit that falls into the basin.

Referring now more particularly to Fig. 4 and the detail views, Figs. 5, 6 and 7, 51 designates a hand lever journaled at its in-

ner end by a hub 52 on the reduced portion 38 of the tool holder supporting arm, said lever extending through an opening 53 (Fig. 3) in the side of the basin 12 and terminating in a handle 54. The outer portion of lever 51, inwardly of the base of the handle 54, is somewhat enlarged and suitably chambered to accommodate adjusting and locking devices, as hereinafter described. In a bearing or bed formed in and crosswise of the enlarged portion of the lever 51 is a horizontal locking bolt 55 formed on its upper side with a rack 56 and in its outer side with three notches, consisting of a central notch 57 and notches 58 and 59 lying to either side of said central notch (see Fig. 5). Journaled in the lever 51 above and at right angles to the locking bolt 55 is a short shaft 60 (Fig. 7) having formed on its inner end a pinion 61 meshing with the rack 56 of the locking bolt and having on its outer end a vertical operating handle 62. One end of the locking bolt 55 has a reduced and flattened extension 63 (Fig. 5) that, when the bolt is shot in one direction by turning the handle 62 downwardly to the right, engages a notch 64 formed in a stationary bracket 65 secured to the outer surface of the basin 12, thereby locking the lever 51 rigid with the frame of the machine. Slidingly mounted within the handle 54 is a spring-actuated locking pin 66 that, when the locking bolt 55 is shot to any of its three positions, automatically engages one of the notches 57, 58 or 59 of the locking bolt to lock the latter in its set position. To a depending extension 52' of the hub 52 of lever 51 is secured by a bolt 116 a counterweight 117 that substantially balances the tool holder and its associated parts when tipped to either side of a vertical position. 67 designates another lever arm that is also mounted to rock on the main supporting arm 38 by means of a hub 68, the forward end of which lever is formed with a worm wheel sector 69 (Fig. 7), with which engages a worm 70 formed on a vertical shaft 71 journaled in upper and lower bearings 72 and 73 formed on the lever 51, the upper end of the shaft 71 having a milled head 74 for actuating the same. Through this worm gear mechanism the lever 67 is at all times connected to the lever 51, and the lever 67 is itself connected to the saddle frame 36 of the tool holder by means of a short upwardly extending arm 75 (Fig. 7) on the lever 67, a sleeve or boss 76 on the upper end of arm 75, and a pin or rod 77 carried by the saddle frame 36 and pivotally and slidingly engaging the sleeve 76. By means of the worm and worm sector connection between the levers 51 and 67 it is possible to adjust the position of the tool held in the tool holder relatively to the emery wheel in a direction at right angles to the axis of the main supporting arm 38,

which is quite desirable where tools are to be ground that, when clamped in the tool holder, project varying distances or at varying angles from the face of the latter.

5 So far as I am aware, in grinding machines of this character no provision has ever been made for power operation of the tool holder. In the present machine I have incorporated a mechanism by which the tool holder can be operated either manually or
10 from the same power shaft by which the spindle and emery wheel are driven, and this mechanism will now be described.

Referring first to Fig. 4, 78 and 79 designate two arms of a power lever that are connected at their inner ends by a bearing ring or hub 80 which is also journaled on the main supporting arm 38, and which lever extends entirely across the basin 12 of the machine frame. As will be seen by reference to Fig. 1, the lever supporting rings or hubs 52 and 80 are set side by side on the arm 38 and are turned down on their inner or opposing faces to provide a seat or bearing for the supporting ring or hub 68 of the lever 67; the entire assembly being confined
25 sidewise between the shoulder 39 of the supporting arm and a ring 81 fastened to the supporting arm. By reference to Fig. 3 it will be seen that the outer end of the lever arm 79 is connected by a pitman 110 to a crank disk 82 fast on a counter-shaft 83 journaled in a gear casing 84 attached to the frame of the machine. The throw of the
30 crank disk 82 is adjustable to any extent desired between zero and the maximum radius of the disk by the connection shown comprising an undercut slot 85 extending diametrically across the face of the disk, and a wrist-pin 86 on which the pitman 110 is mounted and which is adjustable lengthwise of the slot 85 by a clamping bolt 87. Splined on the inner end of the drive shaft
40 15 is a pinion 88 controlled by a lever 89 pivoted to the gear casing 84 and connected by a link 90 to the lower end of an arm 91 fast on a shaft 92, which latter is journaled in a bearing bracket 93 and carries at its other end an operating handle 94. By this
50 means the pinion 88 is slidable into and out of engagement with a spur gear 95 journaled within the gear casing 84, which spur gear 95 carries a pinion 96 that, in turn, meshes with a spur gear 97 fast on the counter shaft 83 that carries the crank disk 82. By manual manipulation of the operating handle 94, therefore, the power lever 78, 79, 80 can be connected with or disconnected from the power shaft 15. The other
60 arm 78 of this power lever extends parallel with the lever arms 51 and 67 through the opening 53 and, at its outer end, is formed with an arc-shaped head 98 in the outer edge of which is formed a groove 99 (Fig. 4) that engages an arc-shaped tongue 100 se-

70 cured to the lever 51. In the inner side of the head 98 of the lever arm 78 is formed a notch or hole 101 (Fig. 5) into which the right hand end of the locking bolt 55 is shot by swinging the handle 62 to the left, thereby locking the lever arm 78 to the lever arms 51 and 67, whereby the oscillating movements of the tool holder around the supporting arm 38 may be effected by power.

From the foregoing it will be readily understood that when the locking pin 66 engages the central notch 57 of the locking bolt the latter is in idle position; when the locking pin 66 engages the right hand notch 59, the lever arms 51 and 67 are locked to the frame of the machine; and when the locking pin 66 engages the left hand notch 58, the lever arms 51 and 67 are locked to the power operating mechanism so as to be actuated by the latter.
85

It may here be noted that the power lever 78 can be allowed to oscillate continuously, even when the operator is oscillating the tool holder by the handle 54; and thus all he has to do when he wishes to connect up the tool holder to the power oscillating lever is to throw the handle 62 to the left and the spring-actuated pin 66 will then force the lock bolt 55 into its seat 101 as the lever oscillates past the lock bolt. As the operator is constantly engaging and disengaging the power oscillating mechanism, this feature is quite valuable since it makes it unnecessary to reach over to handle 94 for shifting the sliding gear in and out every time that he wishes to change from manual to power operation and the reverse..
100

In Figs. 8 and 9 I have illustrated a novel tool holder attachment for effecting the grinding of broad facing cutters. In these views 102 designates the tool clamp formed on its face with a horizontal groove or channel 103 in which the tool is secured by clamp screws 104. The tool clamp is formed with a dovetail slide 105 on its rear side which engages a slideway 106 in a holder 107, being confined in place by a gib 108. The holder 107 is formed with a stem or shank 109 that is secured in the tool holder head proper 30. On the lower edge of the tool clamp 102 is a rack 111 engaged by a pinion 112 on the lower end of a shaft 113 journaled in a vertical bearing 114 on the rear side of the holder 107; and on the upper end of the shaft 113 is an operating handle 115. In using this attachment the same is mounted by its shank 109 in the head 30, the latter is adjusted to proper position relative to the emery wheel and is locked stationary in such position by the locking pin 55 engaging the notch 64 in the bracket 65, and also by the clamp screw 40, and the tool is moved back and forth across the face of the emery wheel by oscillating the arm 115. As shown, the pinion 112 is made of rather large diameter
125 130

so that it is only necessary to swing the handle 115 through an arc of about 120 degrees.

I claim:

1. In a tool grinder, the combination with an emery wheel, and a tool holder head mounted to oscillate across the face of said emery wheel, of means for locking said tool holder head in stationary position whereby to adapt the same to receive a manually operated attachment for the grinding of broad facing cutters and like tools.

2. In a tool grinder, the combination with a column and an emery wheel journaled in the upper end of said column, of a basin formed integrally with said column, a horizontal arm at its outer end projecting through and supported by one side of said basin, a tool holder mounted on said arm within said basin, and means for oscillating said tool holder across the face of said emery wheel.

3. In a tool grinder, the combination with a frame and an emery wheel journaled therein, of a horizontal arm on said frame, a tool-holder mounted to oscillate on said arm, a hand lever pivoted at its inner end on said arm and connected to said tool-holder, and means for locking said hand-lever to the said frame.

4. In a tool grinder, the combination with a frame and an emery wheel journaled therein, of a horizontal arm on said frame, a tool holder mounted to oscillate on said arm, a hand lever connected to said tool holder, a locking bolt slidably mounted in said hand lever, a bracket secured to the frame laterally opposite said hand lever and formed with a socket to receive one end of said locking bolt, and means on said hand lever for actuating said locking bolt into and out of engagement with said socket.

5. In a tool grinder, the combination with a frame and an emery wheel journaled therein, of a horizontal arm on said frame, a tool holder mounted to oscillate on said arm, a hand lever connected to said tool holder, a locking bolt slidably mounted in said hand lever and formed with a rack bar on one side thereof, a bracket secured to the frame laterally opposite said hand lever and formed with a socket to receive one end of said locking bolt, a pinion journaled in said hand lever and engaging said rack bar, and means for turning said pinion.

6. In a tool grinder, the combination with a frame and an emery wheel journaled therein, of a horizontal arm on said frame, a tool holder mounted to oscillate on said arm, a hand lever connected to said tool holder, a locking bolt slidably mounted in said hand lever, a bracket secured to the frame laterally opposite to said hand lever and formed with a socket to receive one end of said locking bolt, means on said hand lever for actu-

ating said locking bolt into and out of engagement with said socket, and means on said hand lever for securing said locking bolt in either locking or released position.

7. In a tool grinder, the combination with a frame and an emery wheel journaled therein, of a horizontal arm on said frame, a tool holder mounted to oscillate on said arm, a hand lever connected to said tool holder, a locking bolt slidably mounted in said hand lever and formed with a rack bar on one side thereof, a bracket secured to the frame laterally opposite said hand lever and formed with a socket to receive one end of said locking bolt, a shaft journaled in said hand lever at right angles to said locking bolt and having a pinion on one end engaging said rack bar, a handle on said shaft for turning the same, and means for automatically securing said locking bolt in locking or released position.

8. In a tool grinder, the combination with an emery wheel, and a tool holder mounted to oscillate across the face of said emery wheel, of hand operated means for oscillating said tool holder, power operated means for oscillating said tool holder, and means for rendering either said hand operating means or power operating means effective at the choice of the operator.

9. In a tool grinder, the combination with an emery wheel, and a tool holder mounted to oscillate across the face of said emery wheel, of a hand lever for oscillating said tool holder, a power actuated lever for oscillating said tool holder, and a locking bolt slidably mounted in one of said levers and adapted to engage and disengage a socket in the other whereby to couple said levers together for power operation of the tool holder or to uncouple them for hand operation thereof.

10. In a tool grinder, the combination with an emery wheel, and a tool holder mounted to oscillate across the face of said emery wheel, of a hand lever for oscillating said tool holder, a power actuated lever for oscillating said tool holder formed with a socket therein, a locking bolt slidably mounted in said hand lever for coöperation with said socket and formed with a rack bar on one side thereof, a pinion journaled in said hand lever and engaging said rack bar, and means for turning said pinion.

11. In a tool grinder, the combination with a frame and an emery wheel journaled therein, of a horizontal arm on said frame, a tool holder mounted to oscillate on said arm, a hand lever connected to said tool holder, a power operated lever pivoted on said frame and extending substantially parallel with said hand lever and formed with a socket therein, a bracket secured to the frame opposite the other side of said hand lever and formed with a socket, a locking

bolt slidably mounted in and crosswise of said hand lever, and means for actuating said locking bolt into engagement with said bracket, or with said power operated lever, or to an intermediate position wherein it is disconnected from both.

12. In a tool grinder, the combination with a frame and an emery wheel journaled therein, of a horizontal arm on said frame, a tool holder mounted to oscillate on said arm, a hand lever connected to said tool holder, a power operated lever pivoted on said frame and extending substantially parallel with said hand lever and formed with a socket therein, a bracket secured to the frame opposite the other side of said hand lever and formed with a socket, a locking bolt slidably mounted in and crosswise of said hand lever, and means for automatically securing said locking bolt in any of said three positions.

13. In a tool grinder, the combination with a frame and an emery wheel journaled therein, of a horizontal arm on said frame, a tool holder mounted to oscillate on said arm, a lever pivoted on said arm and connected to said tool holder, a second

lever pivoted on said arm and extending alongside said first named lever and terminating in a handle, and means connecting said levers for simultaneous operation, said connecting means including mechanism for varying the vertical angle formed between said levers whereby the relative position of the tool holder may be varied with relation to the emery wheel in a direction at right angles to said horizontal arm.

14. In a tool grinder, the combination with a frame and an emery wheel journaled therein, of a horizontal arm on said frame, a tool holder mounted to oscillate on said arm, a lever pivoted on said arm and connected to said tool holder, a second lever pivoted on said arm and extending alongside said first named lever and terminating in a handle, a worm wheel sector formed on one of said levers and a worm journaled in the other lever engaging said worm wheel sector, and means for turning said worm.

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