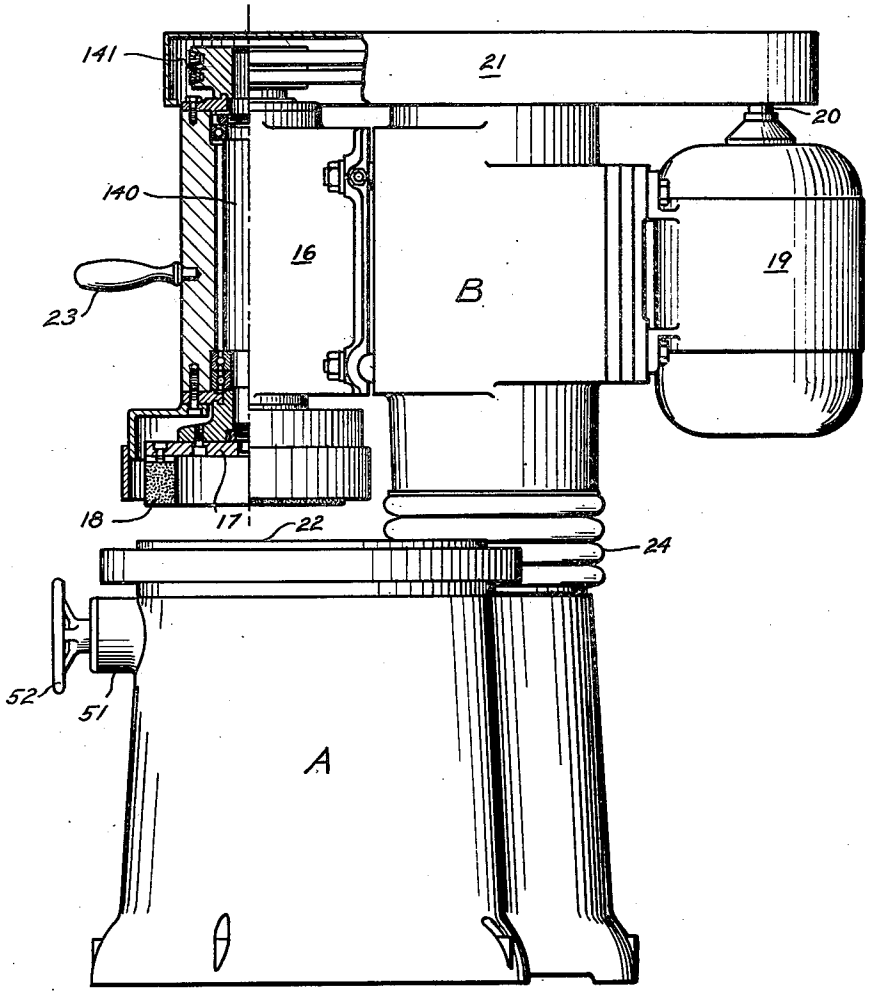
July 15, 1952 A. J. BOWEN 2,603,041

SURFACE GRINDER

Filed Sept. 27, 1945 8 Sheets-Sheet 1

Fig. 1



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SURFACE GRINDER

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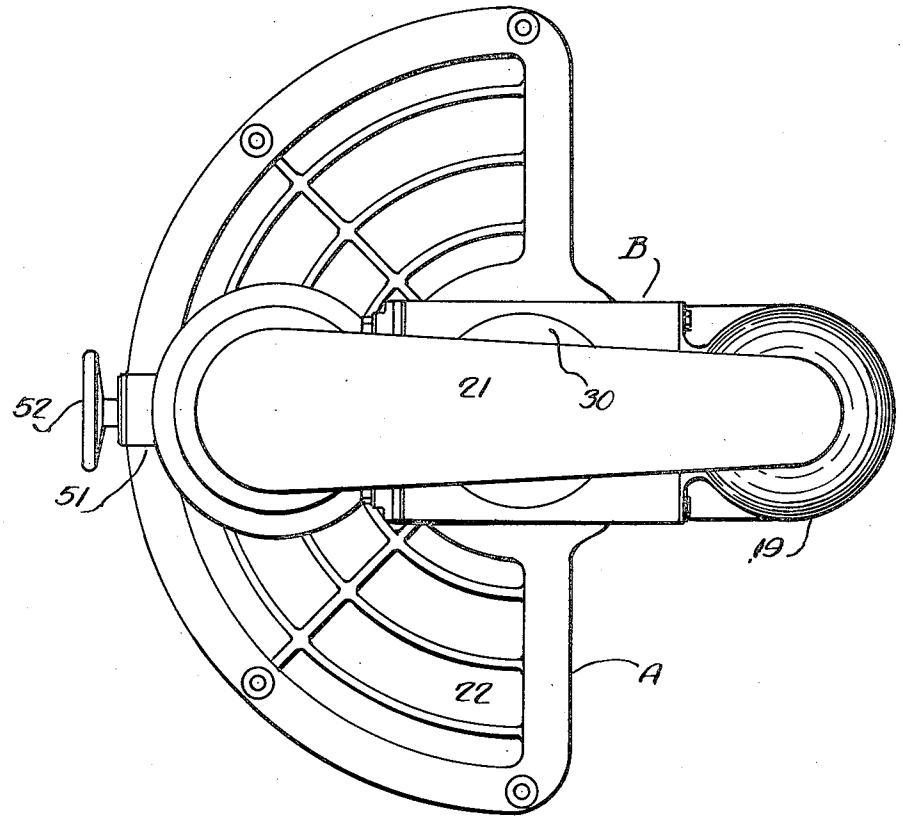


Fig. 2.

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SURFACE GRINDER

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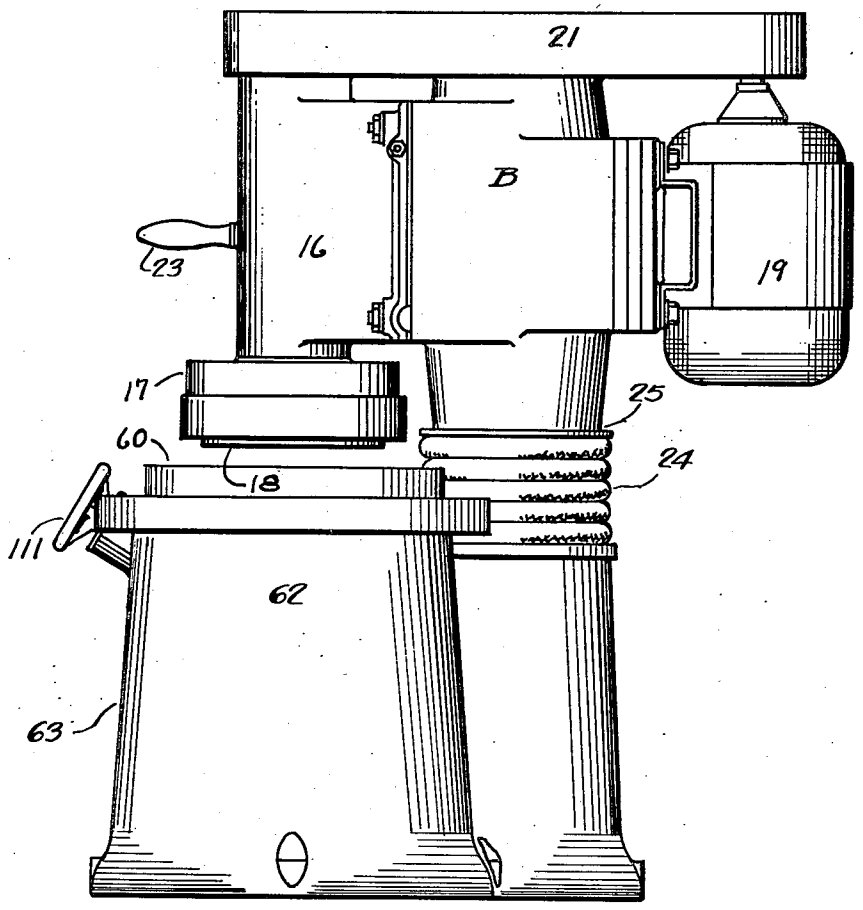


FIG. 3.

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SURFACE GRINDER

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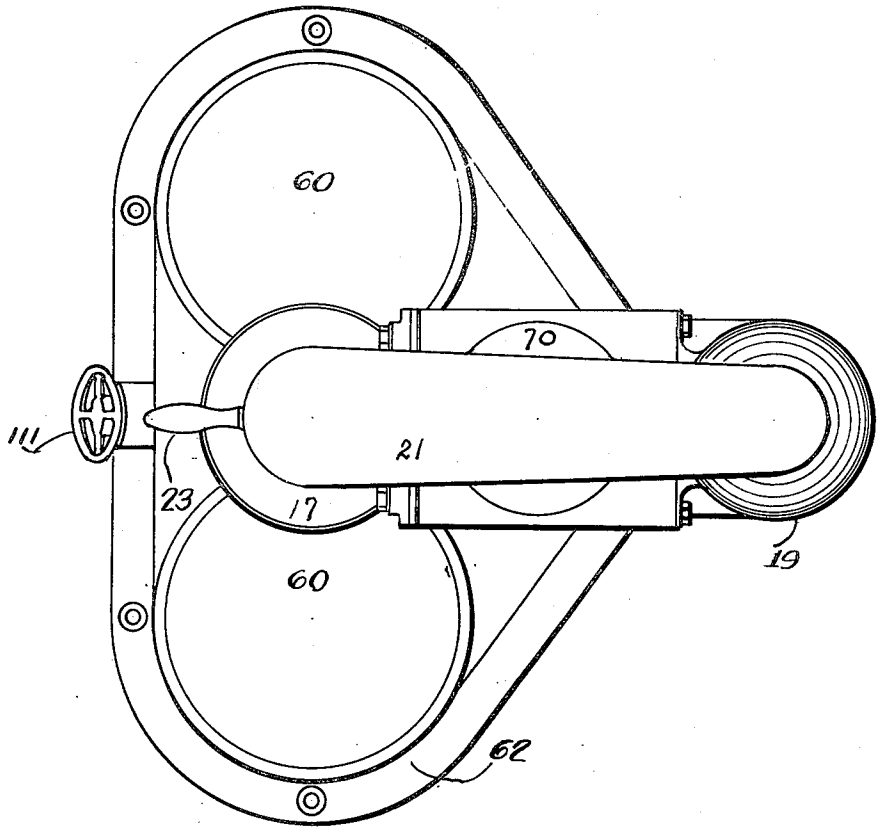


FIG. 4.

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SURFACE GRINDER

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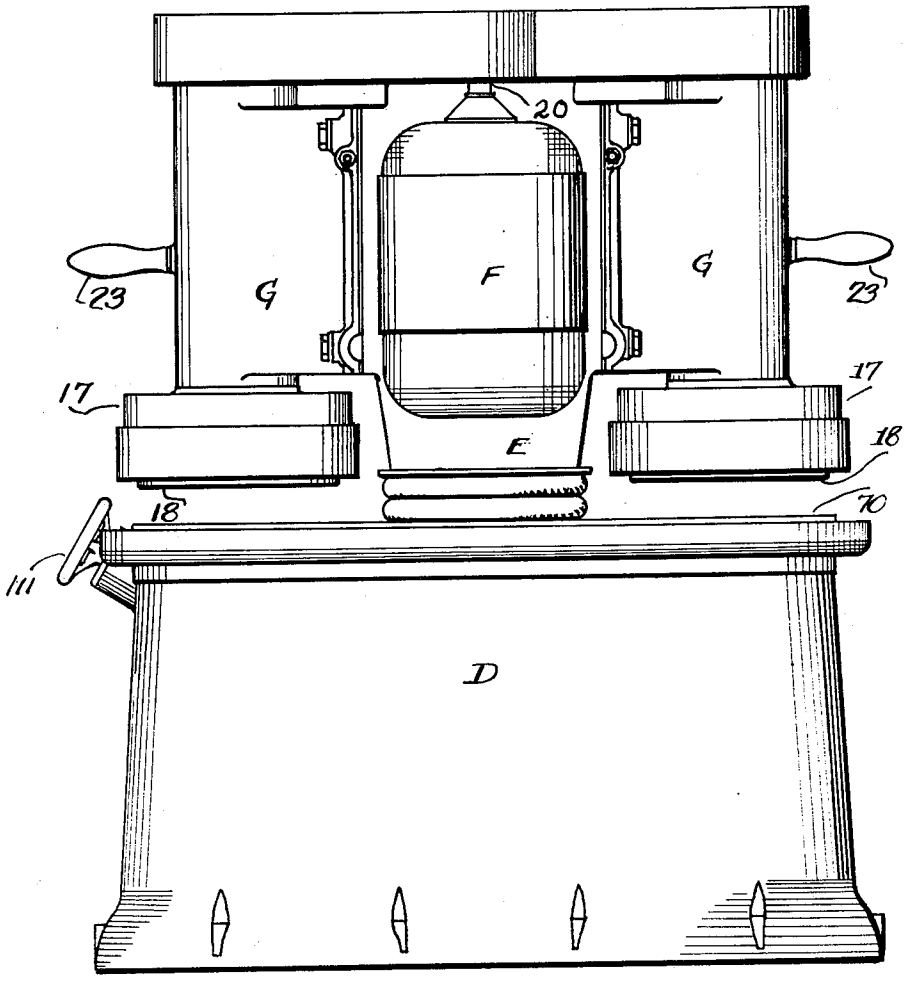


FIG. 5.

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SURFACE GRINDER

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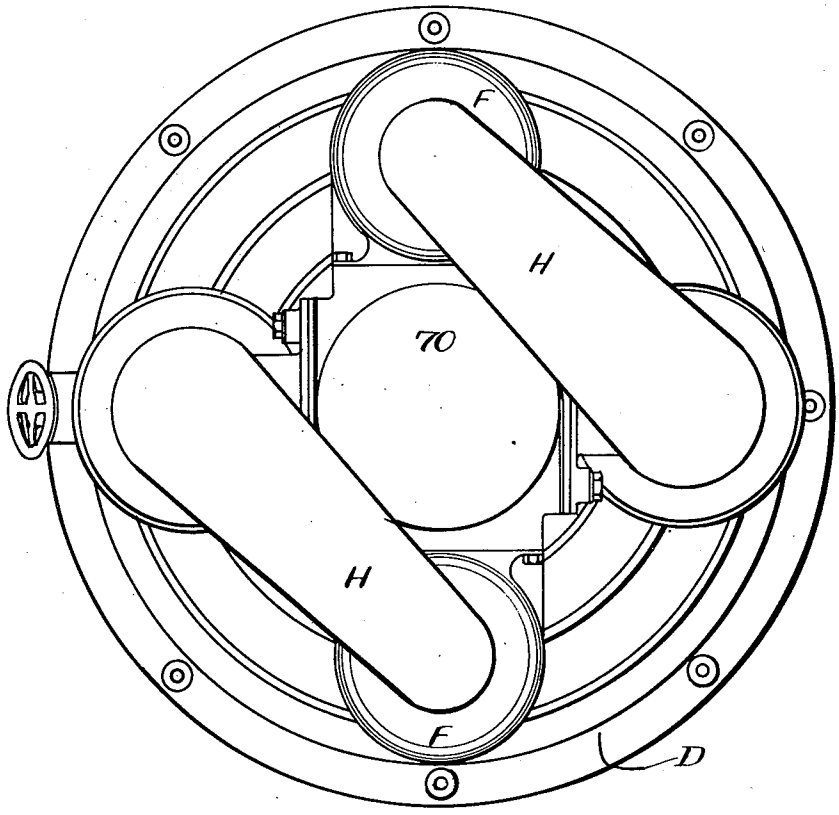


FIG. 6.

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SURFACE GRINDER

Filed Sept. 27, 1945 8 Sheets-Sheet 7

Fig. 7

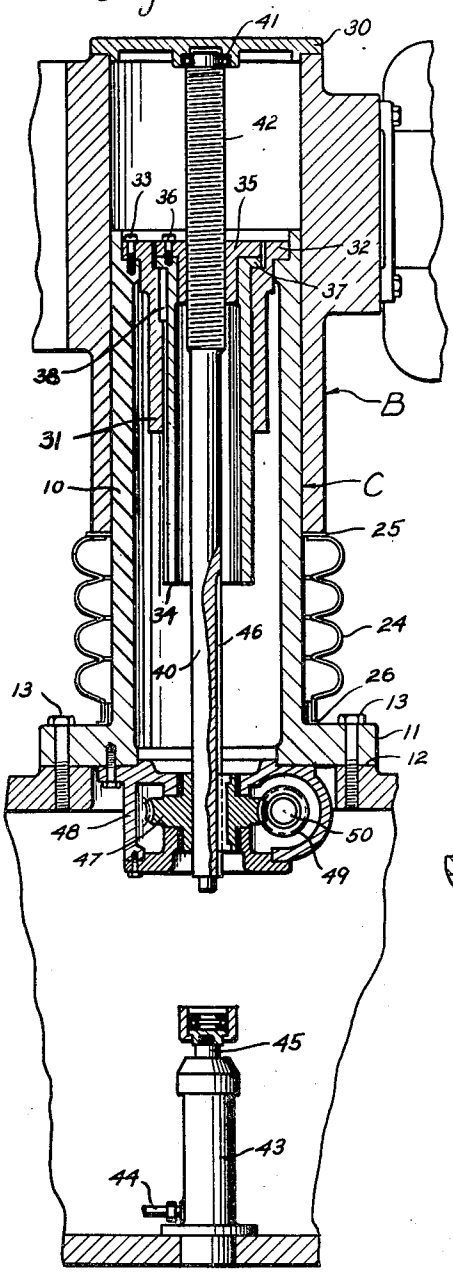


Fig. 10

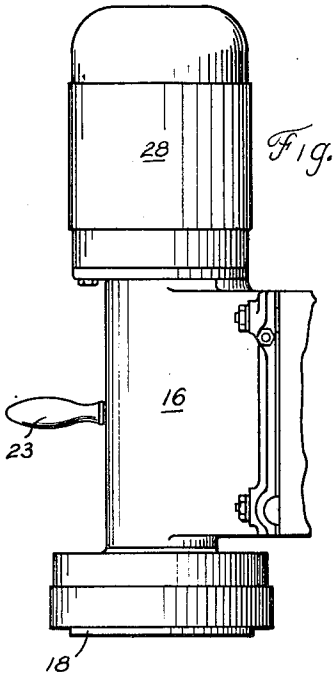
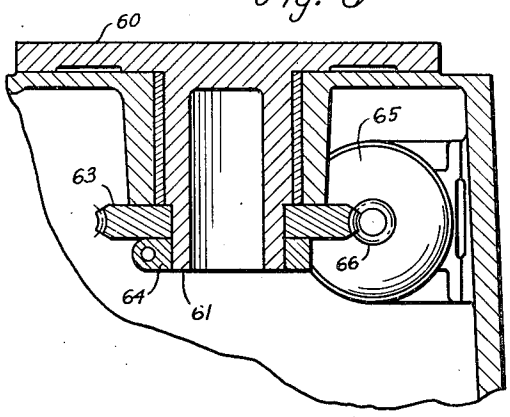


Fig. 9



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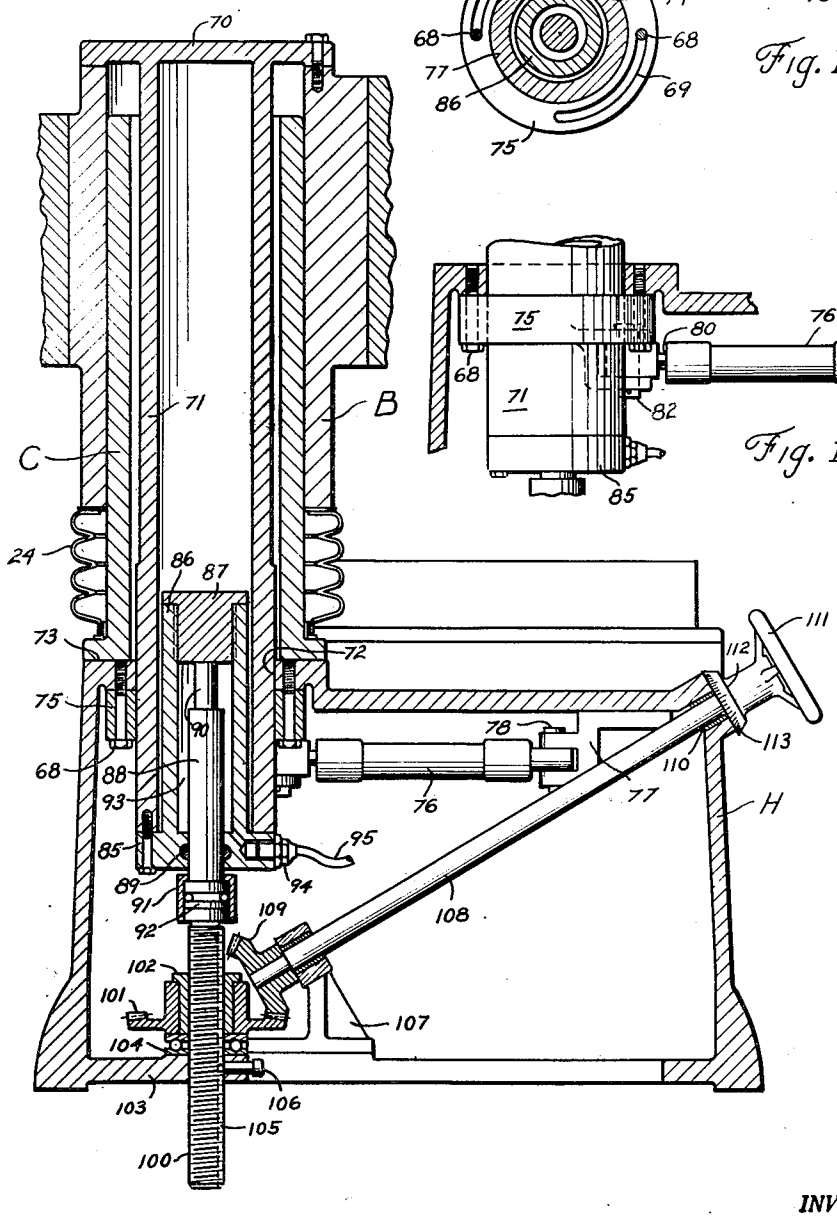
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SURFACE GRINDER

Filed Sept. 27, 1945 8 Sheets-Sheet 8

Fig. 8



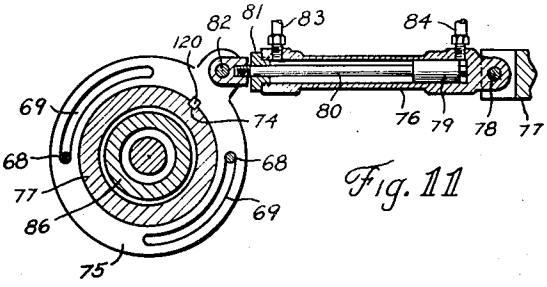


Fig. 11

Fig. 12

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Patented July 15, 1952 2,603,041

UNITED STATES PATENT OFFICE

2,603,041

SURFACE GRINDER

Alfred J. Bowen, Beloit, Wis.

Application September 27, 1945, Serial No. 618,905

13 Claims. (Cl. 51—55)

1

Objects of the present invention are to provide a grinding machine for finishing flat surfaces which is capable of high degree of accuracy, can be manufactured at low cost, can be easily manually or mechanically controlled, is simple in construction and has all working parts practically protected from dust, dirt, grinding material and the like.

An object of the present invention is to provide a design which is rugged and can be manufactured and assembled and made ready for shipment with the work holding surface in perfect alignment with the grinding surface.

An object of the present invention is to provide a general design which can be adapted for different requirements of surface grinding.

An important object of the present invention is to provide a base having mounted thereon a relatively large diameter and hollow post on which to rotatably and slidably mount the head which carries the face grinding wheel or wheels and whereby after the parts have been assembled into a complete machine, the work holding surface may then be ground true, and whereby this operation may be repeated after an extended use of the machine so as to again perfectly true the work holding surface.

Another important object of the present invention is to provide a design wherein the average manufacturing machine shop practice may be followed without scraping or hand fitting, thus to reduce the cost of a machine which is capable of a high degree of accuracy.

An important object of the present invention is to reduce the moving parts associated with the grinding wheel or wheels to a minimum, attention being called to the fact that there are but two of such parts, one the fit of the head over the post and the other the bearings on which the shaft of the grinding member is journaled, these being preferably anti-friction bearings and spaced a considerable distance apart thus to doubly insure accuracy of work.

It will be noted that an important feature of my design is that the device may be provided with one or more rotating work holding platens, and the grinding element moved from one work holder to the other thus to insure extreme accuracy in grinding and provide time for loading the idle work holding platen while the work on the other platen is being ground.

Still another object of the present invention in addition to providing work holding means on one side of the machine, is to provide a circular work holding table which surrounds the post and

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wherein the head may if desired be provided with two equally spaced grinding wheels which move around the post and grind the pieces of work successively, thus giving one or more attendants an opportunity to remove and reload the work, or wherein the grinding wheels may be closely spaced and provide a roughing and finishing operation.

In the field of surface grinders for grinding flat surfaces there are two types, one employing the periphery of the grinding wheel and the other employing the flat surface of a cup, ring, disc or segmental type of wheel. My invention concerns only the later type of grinder. Normal practice is for the work holder to traverse or rotate the part being surfaced or ground so these parts follow a path across the wheel which is doing the grinding. In other cases the grinding wheel is traversed back and forth across the work to be ground. All such types of machines employ ways upon which either the wheel or the work holder is traversed. These ways are subject to wear and are difficult to maintain due to their location which is of necessity directly exposed to highly abrasive dust or coolant mixture. In addition to these disadvantages they generally present very expensive manufacturing operations.

All of the above disadvantages are eliminated in my construction, and in addition I present advantages in construction and operation which will hereinafter appear.

To these and other useful ends my invention consists of parts, combinations of parts or their equivalents and mode of operation as hereinafter described and claimed and shown in the accompanying drawings in which:

Fig. 1 is a side elevational view of the simplest form of my invention.

Fig. 2 is a top view of the device as shown in Figure 1.

Fig. 3 is a side elevational view of a modification.

Fig. 4 is a top view of the device as shown in Figure 3.

Fig. 5 is a side elevational view of a further modification.

Fig. 6 is a top view of the device as illustrated in Figure 5.

Fig. 7 is a sectional view of one form of the controlling means which may be used in the various designs, wherein the grinder wheel or wheels may be moved back and forth over the work manually or mechanically and raised and lowered at the will of the operator.

Fig. 8 illustrates a modified form of controlling mechanism.

Fig. 9 illustrates the means for driving the work holding platen illustrated in Figures 3 and 4.

Fig. 10 illustrates a modification wherein the driving motor 28 is direct coupled to the grinder wheel shaft.

Figs. 11 and 12 illustrate the hydraulic means for moving the grinding discs back and forth over the work in the designs shown in Figures 3, 4, 5 and 6.

As thus illustrated it will be seen that applicant's invention may be made in various forms each of which have the same fundamental characteristics as hereinbefore mentioned.

Referring now to Figures 1, 2 and 7, the base of my device is designated in its entirety by reference character A. The head which carries the motor and grinding element is designated in its entirety by reference character B; a post which is designated in its entirety by reference character C comprises a tube member 10 having a flange 11 which rests on a machined surface 12 on the top of member A and is securely fastened to this surface 12 by means of a number of cap screws 13. Member B is slidably and rotatably mounted on member C.

On one side of member B I mount a bracket 16 in which is journaled a shaft 140 having mounted on its lower end a disc 17, the disc being adapted to carry a grinding member 18. On the upper end of the shaft I preferably mount a multiple V belt sheave 141; and on the other side of member B I suitably mount a motor 19, the shaft 20 of which is preferably provided with a multiple V belt sheave; and V belts are provided to form an operating connection between motor 19 and the upper end of the shaft which carries member 17.

I provide a shield 21 adapted to protect or shield the belts. It will be seen that grinding surface 18 will be driven by motor 19, and that the upper surface of member A in addition to surface 12 has a machine trued work holding surface 22 with means for attaching the work either with clamps or magnetically.

I provide a handle 23 whereby surface 18 may be moved back and forth manually over surface 22 for grinding or surfacing whatever parts are placed thereon. I also provide a collapsible tube 24 which is secured at its top to member B as at 25, its lower end resting freely on the top of flange 11 as at 26. This tube may be made of rubberized fabric material or rubber, or it may be made in two or more telescoped pieces of metal, and is adapted to shield the surface of post C in whatever vertical position member B may be in. When member B is turned on post C the bottom end of member 24 will slide on flange 11 as at 26. Thus any abrasive material or metal dust released while operating the grinder will not be permitted to contact the machined surface of member C.

It will be understood that I may provide mechanical means for moving grinder surfacer 18 over the work. One of such means will hereinafter appear, however for small machines I prefer to use handle 23 for the purpose.

I provide means as illustrated in Figure 7 for raising and lowering head B. This head is provided with a cap 30. Within member C I mount a sleeve 31 preferably near the top of member C by means of a flange 32 and holding bolts 33. I slidably key a sleeve 34 in member 31, the upper end of this flanged member having a screw-threaded sleeve 35 which is held to member 34 by means of bolts 36. It will be noted that the vertical position of member 34 is limited downwardly by means of a flange 37.

Member 34 is slidably keyed into member 31 as at 28. I provide a shaft 40 which extends from the interior of base A to cap 30, the cap resting on shaft 40 by means of a ball bearing 41. Shaft 40 is screw-threaded as at 42 into member 35, thus it will be seen that by turning shaft 40, head B may be raised and lowered, head B being shown in Figure 7 as near its uppermost position. The head may be temporarily raised by raising shaft 40 and sleeve 34 by means of a hydraulic jack 43 having a tube connection 44 which leads to a control valve (not shown), whereby the piston 45 of jack 43 may be raised and lowered and in turn raise and lower head B.

Clearly when the pressure is released in jack 43 the weight of member B will cause sleeve 34 to assume the position shown in Figure 7. It is the intention to permit member B to return freely to its adjusted position which is determined as follows:

Shaft 40 is key seated as at 46, and a worm gear 47 is slidably keyed to shaft 40 and held between suitable bearings in a bracket 48. I provide a worm pinion 49 which meshes with the teeth of gear 47 and is mounted on a shaft 50 which extends through a bearing member 51 on member A and has secured on its protruding end a hand wheel 52.

Thus it will be seen by scrutinizing Figures 1 and 7 that the operator by manipulating wheel 52 may determine the lowest position of head B, which is the operating or grinding position as shown in Figure 7. By means of jack 43 head B may be lifted temporarily high enough so that the grinding disc clears the work as it is returned to the starting position and then lowered to its definite adjusted grinding position. In larger machines means are provided for moving head B back and forth or around the post C hydraulically as will hereinafter appear.

Referring now to Figures 3, 4 and 9, it may be said that this design is similar to Figures 1 and 2 with the exception of the shape and construction of the work holding means. In this design there are provided preferably two revolving work holding tables 60—60. Each of these tables is mounted on a post such as 61 which is suitably rotatably mounted in and on the base which is designated by reference character 62. Member 61 has rigidly secured thereto near its lower end a worm gear 63 with a holding on collar 64.

I provide preferably two driving motors 65 (one not shown) suitably secured to member 62, each having a worm pinion 66 which meshes with the teeth of the associated gear 63. Thus it will be seen that there is provided preferably a pair of revolving work holding tables and that these tables may be loaded with work to be faced alternately.

Member 18 may be moved to a position in which it covers about one half of the diameter of one of the tables 60, which is turned slowly by motor 65 so that the work piece thereon is suitably surfaced. At this time the other table may be stopped and loaded. It will be seen that an ideal condition exists for perfectly surfacing the work because there is a multiplicity of criss-cross lines of contact between the grinding disc and the work.

In addition to the designs already described other designs may be provided as in Figures

5 and 6, wherein the work table extends for 360 degrees around the post. In this design I prefer to supply two grinding members positioned on opposite sides of the post and having a separate motor operatively connected to each grinding disc, so the head may be moved back and forth or revolved around the post. In this design, the base is designated in its entirety by reference character D, the head in its entirety is designated by reference character E and the post as in the other figures.

The advantage of this design is that the grinding elements may operate continuously when for example two grinding heads are used with two attendants for placing the work pieces in position and removing them after they have been surfaced.

Either of the operations referred to are possible because the head turns on its post very slowly. It will be understood that the head may be moved back and forth either manually or by hydraulic means as will hereinafter appear. In this design the driving motors F—F are preferably secured to opposite sides of member E from the grinding discs as shown. In this design shafts are journaled in members G having on their lower ends the discs 17 with the grinding surfaces 18 attached thereto as in Figures 1, 2, 3 and 4. The upper ends of the shafts to which members 17 are attached are preferably provided with V belt pulleys; motors F are provided with V belt pulleys; and the operating connections between the motors and their respective shafts are made by means of V belts.

In this design and the design shown in Figures 3 and 4, means may be provided for turning head B back and forth hydraulically. This means and the means for raising and lowering the head are shown in detail in Figures 8, 11 and 12.

I will now describe the controlling mechanism used preferably in the designs shown in Figures 3 to 6 and shown in detail in Figures 8, 11 and 12.

Referring now to Figures 8, 11 and 12, the base is designated by reference character H, the hollow post is similar to the hollow post in the other design and is designated by reference character C, the head is similar to that shown in Figures 1 through 6 and is designated by reference character B. A closure cap 70 for member B is provided with a downwardly extending sleeve 71 which is rotatably and slidably mounted in an opening 72 in the top of base H.

Member C is supported on a machined surface 73. Member 71 is key seated as at 74 and a head 75 having a key 120 which fits into seat 74 is slidably mounted on member 71 and rotatably secured to base H by bolts 68, the bolts extending through slots 69, so member 75 can act to turn member 71 back and forth hydraulically as follows:

A hydraulic cylinder 76 is hingedly connected to an anchor bracket 77 as at 78, the cylinder having a piston 79 with a piston rod 80 which protrudes through an end closure 81 of the cylinder, the end being hingedly connected to member 75 as at 82. Tube connections 83 and 84 are made to opposite ends of cylinder 76. These connections lead to a manually controlled valve which is associated with a hydraulic pump (not shown), whereby the operator may, by manipulating the valve, move head B back and forth on post C as an axis, thus moving the head hydraulically instead of manually as in Figures 1 and 2.

I provide means for raising and lowering head B as follows: A cap 85 is secured to the lower end of member 71 having a sleeve 86 with a cap 87 secured to its upper end. A shaft 88 is slidably mounted in member 85 having a packing 89. The upper end of shaft 88 is reduced somewhat as at 90, its end resting against cap 87. It will be seen that a chamber 93 is provided into which a fitting 94 leads, having a tube 95 which leads to a control valve, which is connected to a hydraulic pump, so by manipulating the valve fluid under pressure may be admitted to and discharged from chamber 93 and head B may be raised and lowered. At the lower end of member 88 I mount a cap 91 containing a ball bearing 92 adapted to rest on the upper end of a screw-threaded shaft 100. The ball bearing permits shaft 88 to turn freely on the end of the screw-threaded shaft. I provide a bevel gear 101 having secured therein a threaded sleeve 102. Member 101 rests on a base extension 103 through a ball bearing 104.

Member 100 is key seated as at 105 and a key 106 is mounted in member 103 so as to engage keyway 105 and prevent shaft 100 from turning. A bracket 107 is mounted on extension 103 and has rotatably mounted therein a shaft 108, the shaft having secured to its lower end a bevel pinion 109. Shaft 108 is rotatably mounted in base H as at 110, the end of the shaft protruding through the base and having keyed thereto a hand wheel 111, the hub of which carries a calibrated disc 112 which may be marked in thousandths of an inch as at 113. A single mark is positioned on base H for cooperation with the calibrations 113 so the operator may turn wheel 111 to raise and lower head B one or more thousandths of an inch at a time.

Thus clearly the design shown in Figure 8 may be used in the design shown in Figures 1 and 2, or as stated before the design shown in Figure 7 may be used in the machine shown in Figures 3 through 6, the manner of raising and lowering head B being the same in either design and if desired the hand piece 23 may be used for moving the discs over the work instead of using the hydraulic means shown in Figures 11 and 12. Whatever manually controlled means are used all of the working mechanism of the control is perfectly protected or enclosed within the base and post C and with the addition of the telescopic seal 24 around member C my device will retain its working efficiency for an indefinite time.

It will be understood that a motor 28 may be mounted on bracket 16 as shown in Fig. 10, the motor shaft being connected to the shaft which carries the grinding wheel 18, thus dispensing with the pulleys, belts and shield. Other changes may be made without departing from the spirit and scope of the invention and I do not therefore wish to be limited to the precise forms of the invention disclosed herein but desire to include and have protected by Letters Patent all forms and modifications thereof which come within the scope of the appended claims.

Having thus shown and described my invention I claim:

1. A surface grinder of the character described comprising, a hollow base, the top of said base being machine trued, an opening in the center thereof, a circular in cross section hollow post secured to said base and surrounding said opening, the outer top portion of the base being concentric with the post and adapted to hold the work to be surfaced, a head slidably and rotatably mounted on said post having a closure

at the top thereof, a disc mounted on the lower end of a vertically arranged shaft which is rotatably mounted on said head, said disc being adapted to carry abrasive material on its lower side, means mounted on said head adapted to drive said disc shaft, means for turning said head continuously on said post as an axis, whereby material placed on said work holding surface may be successively surfaced by the disc, manually controlled means adapted to slide the head vertically on said post, and a manually adjusted stop adapted to limit the downward movement of the head.

2. A device as recited in claim 1 wherein a collapsible tube is provided surrounding said post, the upper end of said tube being secured to the bottom of said head with its bottom end resting freely on the top of said base, whereby the part of said post between the head and base is protected from contact with loosened abrasive material, metal dust and foreign matter.

3. A device as recited in claim 1 wherein all of said manually controlled parts are located substantially within said post and base to thereby prevent contact with loosened materials and dust.

4. A grinding machine of the character described comprising, a hollow base, the top of said base being so machine trued and having an opening in the center thereof, a circular in cross section hollow post secured to said base and surrounding the opening, a head slidably and rotatably mounted on the post and having a closure on the top thereof, a disc rotatably mounted on said head with its lower side adapted to carry abrasive material, means for rotatably driving said disc and means for rotatably driving said head, the remainder of the machine surface of said base being concentric with said post and arranged that the work to be surfaced may be secured thereto, said disc being positioned whereby the work may be surfaced as the head travels around the circle, and means whereby said head may be raised and lowered on said post.

5. In a surface grinder, a base having a horizontal work holding surface, a vertical column or post fixed to and extending upward from said base above said surface, a head member slidably and rotatably mounted on said post by means of a bearing comprising an internal cylindrical bearing surface in said head in engagement with an external cylindrical bearing surface on said post, a motor and an oppositely disposed vertical shaft supported on said head, a grinding wheel mounted on said shaft above said base, a driving connection between said motor and said shaft, means including an antifriction thrust bearing supporting the weight of said head and parts mounted thereon on said post during rotation of said head, said last means also including a micrometer screw disposed on the axis of said post and in operative engagement with said thrust bearing, and means in said grinder connected to said screw to rotate the same to adjust the elevation of said grinding wheel with respect to work supported on said base by sliding said head on said post, said head being rotatable to and fro about said post on said thrust bearing in any adjusted position to traverse said grinding wheel over said work.

6. In a surface grinder, a base, a vertical post fixed to and extending upward from said base, said base having an arcuate work supporting surface extending around said post as a center for at least approximately 180 degrees, a head mounted on said post, a grinding wheel and driving means therefor mounted on said head with said wheel above said surface, a bearing included in the means for mounting said head and comprising an axially movable cylindrical internal bearing surface in said head engaging a relatively longer cylindrical external bearing surface on said post, said bearing providing for sliding movement of the head on said post and independent rotation of said head about said post to move said grinding wheel back and forth in an arcuate path over work supported on said base, mechanism operatively connected between said post and head to support the weight of said head during rotation thereof about said post, said mechanism comprising in serial weight supporting relation a thrust bearing, a micrometer screw disposed coaxially with said post, a nut threaded on said screw, and a load sustaining member connected to said nut, and a manually operable device having a sliding connection with said screw to rotate the same in said nut to thereby slide said head on said post and adjust said wheel relative to said work.

7. A surface grinder of the character described, comprising a base, a work holding table rotatably mounted on said base, motor means connected to said table to rotate the same, a post secured to said base and extending vertically upward from the level of said table, a head mounted on said post by means of a bearing, said bearing comprising an external bearing surface on said post and an internal bearing surface in said head in slidable and rotatable engagement with said external bearing surface, a shaft rotatably mounted on said head and carrying a grinding wheel above said table, a motor mounted on said head opposite said shaft, means connecting said shaft with the motor shaft, said head being rotatable at its bearing on said post to impart a reciprocating movement to said grinding wheel over said table, mechanism operatively connected between said head and post to support said head against sliding movement on said post during the said movement of said grinding wheel, said mechanism including a thrust bearing and a lead screw disposed coaxially with said post, and manually operable means operatively connected to said lead screw to rotate the same and thereby slide said head on said post to regulate the distance between said grinding wheel and said table in accordance with the thickness of the work thereon.

8. In a surface grinder, a base, a horizontal work holding surface on said base, a vertical column fixed to and extending upward from said base above said surface, a head slidably and rotatably mounted on said column, a radial face grinding wheel mounted on said head and adapted to be traversed back and forth in grinding relation to a work piece supported on said surface by rotation of said head on said column, elements including a thrust bearing, a screw threaded shaft and a nut threaded thereon operatively disposed on the axis of said column and supporting the weight of said head during the said rotation thereof, a support on said column engaged by one of said elements and sustaining said weight, a member rotatably mounted on the axis of said column, a sliding but non-rotative connection between said member and said shaft, and means operatively connected to said member to rotate the same to rotate said shaft in said nut to thereby raise or lower said

grinding wheel relative to said work piece by sliding said head on said column.

9. In a surface grinder, a base having a work supporting surface, a vertical column fixed to said base and extending upward from said base above said surface, a head carrying a grinding wheel and driving means therefor, bearing means slidably and rotatably mounting said head on said column, means including a thrust bearing and a pair of inter-engaging threaded members disposed on the axis of said column and supporting the weight of said head during sliding and rotary movement thereof on said column, means connected to one of said members for rotating the same relative to the other said member to adjust said grinding wheel relative to a work piece on said surface by sliding said head on said column, and means for rotating said head about said column on said thrust bearing to traverse the grinding wheel in an arcuate path over said work piece to grind the same, said last means comprising hydraulic mechanism including a cylinder and piston operatively connected between said head and said base.

10. In a surface grinder, a vertical column, a supporting head for a grinding wheel mounted on said column, the mounting comprising bearing means providing for sliding movement of the head on said column and rotation of the head about the column as an axis, a radial face grinding wheel and driving means therefor mounted on said head, a screw threaded member having a support on said column, said member being vertically movable relative to said support, cooperating elements including said member, a second screw threaded member in threaded engagement therewith and a thrust bearing supporting said head on said column during rotation of said head about said column, said threaded members and said thrust bearing being coaxial with said column, means connected to one of said screw threaded members for rotating the same relative to the other said member to adjust said grinding wheel relative to a work piece by sliding said head on said column, said first member resting on said support during such adjustment and said head being rotatable at the same time about said column on said thrust bearing to traverse the grinding wheel in an arcuate path over said work piece to grind same, and means for lifting said first member off said support and returning it thereto to raise and lower said grinding wheel relative to said work piece without disturbing the adjustment effected by means of said members, said lifting means comprising a jack disposed beneath said column, said jack including a vertically movable member adapted to operatively engage one of said supporting elements and thereby raise and lower said grinding wheel as set forth.

11. In a surface grinder, a base having a horizontal work supporting surface, a vertical post fixed to and extending upward from said base above said surface, said post having a long external bearing surface, a grinder head slidably and rotatably mounted on said post by means of an internal bearing surface engaging said external bearing surface, said internal bearing surface being substantially shorter lengthwise of the post than said external bearing surface to provide for the sliding movement of the grinder head, a motor mounted on said head, a vertical shaft rotatably mounted on said head at a fixed distance from said post and having a driven connection with said motor, a radial face grinding wheel mounted on said shaft and movable to and fro in an arc with its radial face parallel to said horizontal surface and in contact with the top of work supported thereon, said head rotating about said post during such movement, mechanism operatively connected between said base and head and supporting the weight of said head and parts mounted thereon during said movement of said grinding wheel, said mechanism comprising in serial relation a thrust bearing, a micrometer screw disposed coaxially with said post, and a nut threaded on said screw, and a device operatively connected with said nut to rotate the same relative to said screw to thereby slide said head downward on said post and establish grinding pressure between the radial face of said grinding wheel and said work by the weight of said head and parts mounted thereon.

12. In a surface grinder, a base having a horizontal work supporting surface, a vertical column fixed to said base and extending upward from said surface, a head mounted on said column, the mounting means comprising interengaging bearing surfaces carried by said head and column, respectively, and providing for simultaneous sliding of the head on said column and rotation of said head on said column, a vertical shaft rotatably mounted on said head at one side of said column, a motor mounted on said head on the opposite side of said column, a driving connection between said motor and said shaft, a grinding wheel mounted on said shaft and having a grinding face above and parallel to said work supporting surface, said grinding wheel being movable in an arc over a work piece on said supporting surface by rotation of said head on said column with said grinding face in grinding engagement with the upper surface of said work piece, a thrust bearing disposed on the axis of said column and including a part rotating with said head, means including said thrust bearing supporting the weight of said head on said column during said rotation of said head and the said arcuate movement of the said grinding wheel, and mechanism connected with said thrust bearing and operative to lower said head by sliding movement thereof on said column to thereby utilize a portion of said weight to effect pressure of the grinding wheel against said work, said mechanism being included with said thrust bearing as part of said weight supporting means and comprising a screw threaded shaft and a nut in threaded engagement therewith, said screw threaded shaft and nut being disposed with said thrust bearing on the axis of said column.

13. In a surface grinder, a base having a horizontal work supporting surface, a vertical column fixed to said base and extending upward from said surface, a head mounted on said column, the mounting means comprising interengaging bearing surfaces carried by said head and column, respectively, and providing for simultaneous sliding of the head on said column and rotation of said head on said column, a vertical shaft rotatably mounted on said head at one side of said column, a motor mounted on said head on the opposite side of said column, a driving connection between said motor and said shaft, a grinding wheel mounted on said shaft and having a grinding face above and parallel to said work supporting surface, means for adjusting the vertical position of said head on said column to bring the grinding face of said grinding wheel into engagement with the top of a work piece on said work supporting sur-

face while permitting rotation of said head to traverse the grinding wheel back and forth with its grinding face in contact with said work piece, said means comprising a support on said column and elements operatively disposed in series on the axis of said column between said support and said head, said elements comprising a threaded shaft, a nut in threaded engagement with said shaft, and a thrust bearing engaged by said shaft, said thrust bearing including a part rotating with said head, and mechanism having an operative connection to one of said threaded members to rotate the same relative to the other said threaded member during rotation of said head and grinding wheel to adjust the position of said head as set forth and regulate the depth of the cut.

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