Feb. 18, 1936. R. ATTI 2,030,850

GRINDING MACHINE

Original Filed July 1, 1931 2 Sheets-Sheet 1

Fig. 1.

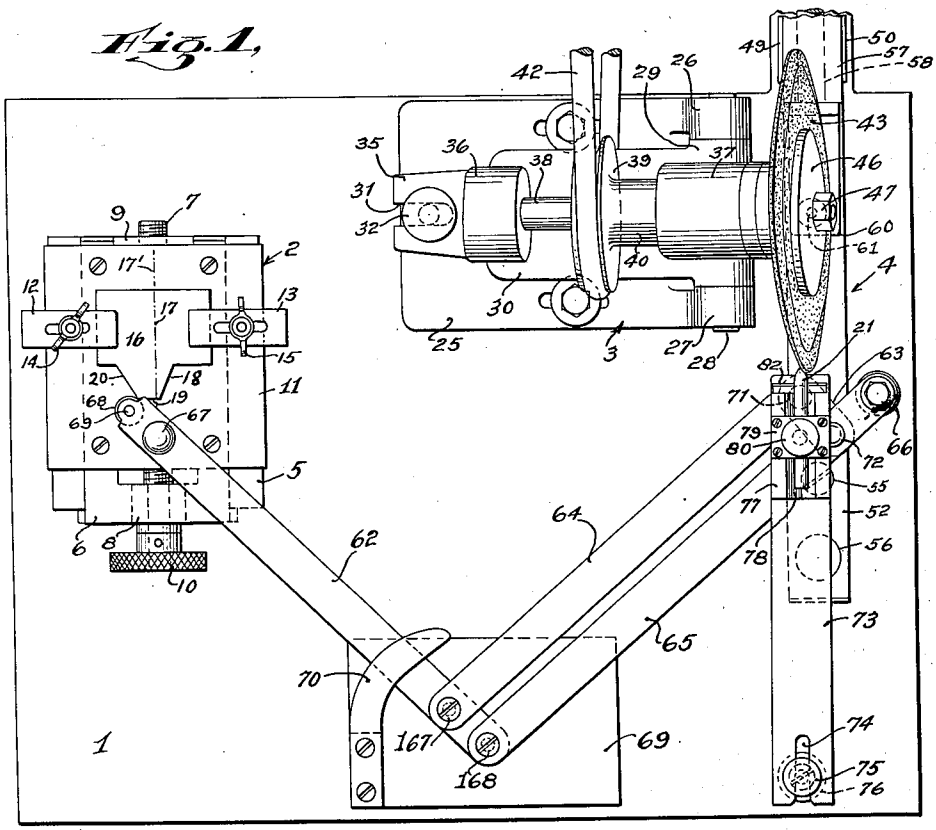
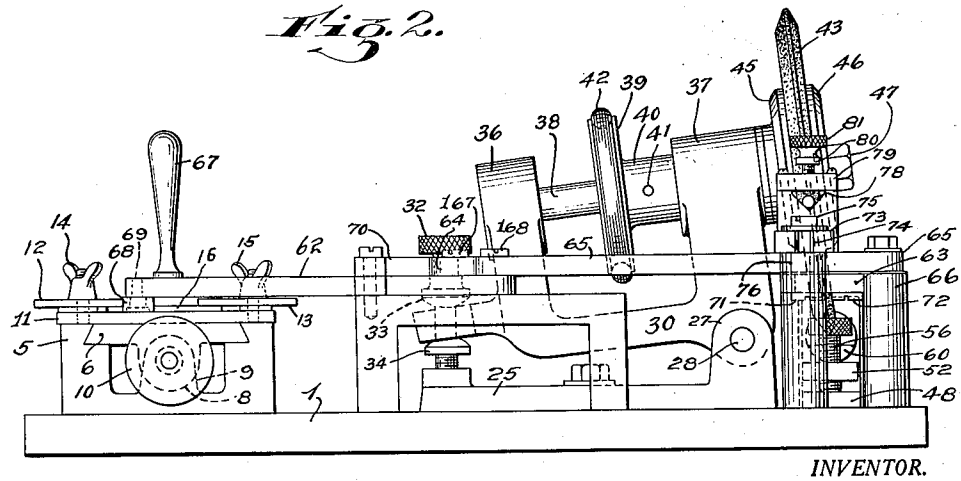


Fig. 2.



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Fig. 3,

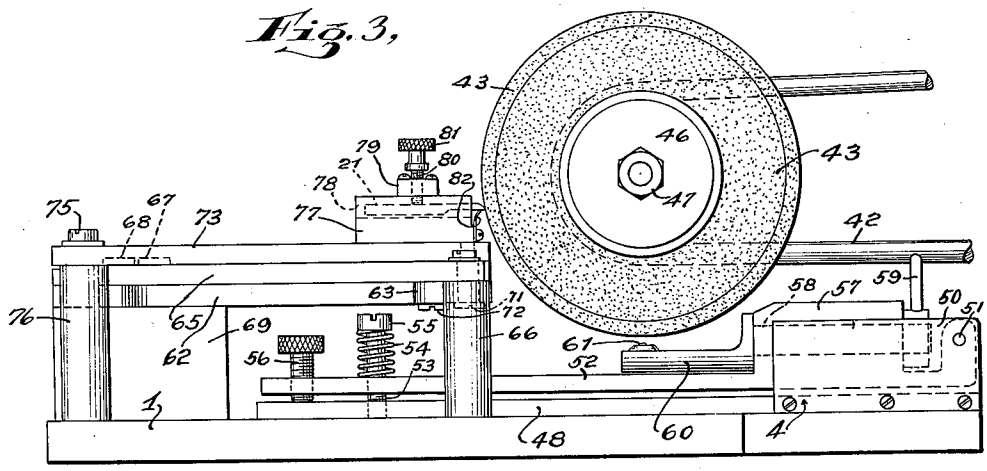


Fig. 4,

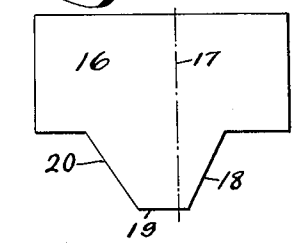


Fig. 6.

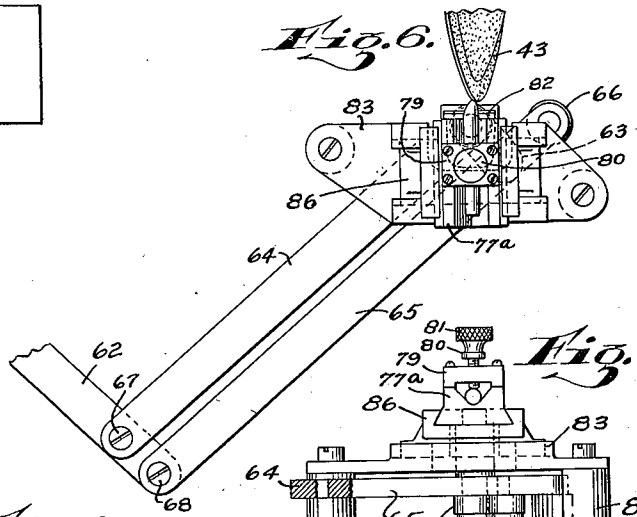


Fig. 5,

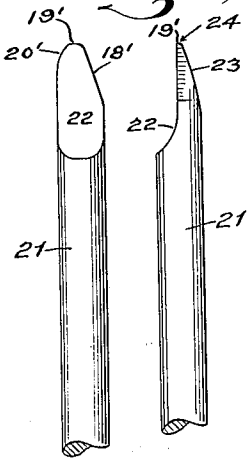
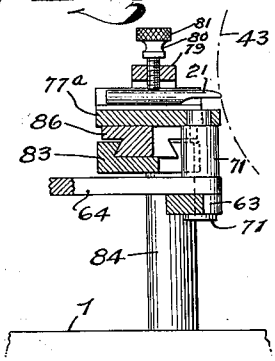


Fig. 7,

Fig. 8.



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2,030,850

GRINDING MACHINE

Raphael Atti, Union City, N. J.

Application July 1, 1931, Serial No. 548,096
Renewed June 10, 1933

16 Claims. (Cl. 51—100)

This invention relates to grinding machines in general and more especially to machines for grinding cutters of the type used in engraving machines and the like.

Among the objects of the present invention, it is aimed to provide an improved grinding machine for cutters whereby cutters of various forms and shapes having various angular relations of cutting edges and clearance edges may be ground expeditiously and accurately.

Cutters according to the work with which they are to be used generally have a definite angular relation of cutting edges and clearance edges. Heretofore the formation of such cutters especially with precision work was a hit and miss operation depending largely upon the skill of the tool maker to produce the proper angular relation of the cutting edges and clearance edges for the work to be performed.

In view of the foregoing, the present invention aims to provide a grinding machine including a tool guiding device whereby the cutter may be accurately reproduced according to a predetermined angular relation of cutting edges and clearance edges.

These and other features, capabilities and advantages of the present invention will appear from the subjoined detail description of specific embodiments thereof illustrated in the accompanying drawings in which

Figure 1 is a plan of the machine with a portion of the device for truing the grinder broken away;

Fig. 2 is a front elevation of the same;

Fig. 3 is a side elevation of the same;

Fig. 4 is an enlarged detail of a master forming part of the engraving tool guiding means;

Fig. 5 is a fragmental front elevation and side elevation of one of the engraving cutters;

Fig. 6 is a fragmental plan of another embodiment of the machine showing a portion of the engraving tool guiding means alone;

Fig. 7 is a fragmental front elevation of the portion of the embodiment illustrated in Fig. 6; and

Fig. 8 is a fragmental sectional view looking at the side of the machine of the embodiment illustrated in Fig. 6.

In the embodiment illustrated in Figs. 1 to 5 inclusive, there is provided a base 1 having formed thereon a master supporting device 2, a grinding wheel supporting device 3, a truing device 4 supported thereon, in addition to supports for the engraving tool hereinafter to be described in detail.

The master supporting device 2 consists essentially of a block 5 secured to the base 1 and having slidably mounted therein the bracket 6 which is anchored and positioned by the screw 7 being screw threadedly connected to the arm 8 of the bracket 6 and to the post 9 of the block 5. The screw 7 is provided with the head 10 for manipulating the same.

On the bracket 6, there is secured a suitable plate or platform 11 having the anchoring plates 12 and 13 formed thereon and adjustably connected to such plate 11 by the nuts 14 and 15. On the plate 11, is supported the master 16 which, see Fig. 4, is preferably provided with a center line 17 and three guiding faces 18, 19 and 20. The face 18 generally constitutes the guide for one of the clearance edges of the engraving tool and the faces 19 and 20 generally constitute guides for the main cutting edges of the engraving tool.

In Fig. 5 there is illustrated an engraving tool 21 which see the left hand figure has formed thereon a clearance edge 18' and two cutting edges 19' and 20' corresponding to the guides 18, 19 and 20 respectively.

The engraving tool as is customary with cutters of this type has a cutaway portion 22 which is more or less concave and a second cutaway portion 23 on the outer side of the cutter and an inclined face 24. The cutaway portions 22 and 23 are generally cut away in advance before the cutters or engraving tools are treated by the grinding machine forming the subject matter of the present invention.

The face 24 however is formed by this grinding machine as hereinafter to be described.

As shown in Fig. 1 the edges of the anchoring plates 12 and 13 overlap the edges of the master 16 to anchor it securely in place, its position being determined more or less by the center line 17' on the plate 11. After being positioned relative to this center line 17' the plate 11 may be further adjusted and therewith the master 16 by the screw 10.

The grinder supporting device consists essentially of a block 25 having bearings 26 and 27 at its end to receive the shaft 28 extending through the journal 29 of the bracket 30. This bracket has a slot 31 in its left hand end to receive the screw 32, screw threadedly connected to the block 25, see Fig. 2 and having the rounded heads 33 and 34 between which the free end 35 of the bracket 30 extends to permit the angular positioning of this bracket relative to the block 25 and to its shaft 28. The bracket 30 has formed thereon

the bearings 36 and 37 to receive the shaft 38. On the shaft 38, there is mounted the sheave 39 having a hub 40 secured to such shaft 38 by a pin 41. This sheave 39 is connected to any suitable source of power by the belt 42. On the right hand end of the shaft 38, there is mounted the grinding wheel 43 which preferably has formed on either side the metal discs 45 and 46 and is secured to the shaft 38 by the nut 47.

The truing device 4 consists essentially of a block 48, see Fig. 3, which has secured thereto the plates 49 and 50 to which at 51 is pivotally connected the bracket 52 through which extends the pin 53 screw threadedly connected to the bracket 48 and having a spring 54 tensed between its head 55 and the upper surface of the bracket 52 determining the position of the bracket 52 relative to the block 48. There is screw threadedly connected to the bracket 52 the screw 56 the end of which engages the upper face of the block 48. The bracket 48 is also provided with a bearing 57 to receive the shaft 58 having a handle 59 connected to one end thereof and an arm 60 to the other end thereof on which is formed the diamond point 61. For truing the grinding wheel 43, it is thus only necessary to manipulate the screw 56 to raise the diamond point 61 into cutting engagement with the grinding wheel 43, thereupon to start the operation of the grinding wheel if it has not already been started and then to engage the handle 59 and turn the same to cause the diamond point 61 to transcribe an arc around the edge of the grinding wheel 48 it being noticed that the diamond point 61 is disposed below the center of the shaft 58.

The engraving tool guiding means consists essentially of a pantographic device having an elongated arm 62 parallel to the short arm 63 which are connected together by the parallel arms or links 64 and 65. The right hand end of the arm 65 extends beyond the short arm 63 and is pivotally connected to the post 66. The left hand end of the arm 62 extends beyond the arm 64 and at its end it is provided with a handle 67 and a roller 68 pivotally mounted by the pin 69 to the extreme end of the arm 62. In the present instance, the arm 62 is about ten times the length of the arm 63 so that the arc transcribed by the left hand end of the short arm 63 will be approximately one having a radius about one-tenth of the radius transcribed by the left hand end of the arm 62 and the throw of the respective left hand ends of the arms 62 and 63 will accordingly be about ten to one so that the length of the faces 18, 19 and 20 relative to the length of the faces of the engraving tool to be cut will be approximately about ten to one.

The arm 62 is pivotally connected to the arms 64 and 65 by the screws 167 and 168 and the arm 62 at its pivotal connection with these arms 64 and 65 is preferably mounted on a guide block 69 which is preferably provided with a lubricant to provide a sliding face for this end of the arm 62 and incidentally support the same and prevent these arms from being subjected to undue strain.

For anchoring the arm 62 in place on the block 69, there is preferably provided the finger 70 which is secured to the block 69 and extends across the arm 62 adjacent to the arm 64 as indicated in Fig. 1.

The arm 63 is pivotally connected to the arms 64 and 65 at 71 and 72 as indicated. Pivotally connected to the pin 71, there is provided the arm 73, the other end of which is provided with a slot 74 to receive the screw 75 secured to the top of the post 76 extending upwardly from the base 1. The screw 75 permits the arm 73 to slide relative to it as the pantographic device is actuated. On the upper face of the arm 73 adjacent to the pin 71, there is provided a work supporting bracket 77 having a longitudinal slot 78 formed therein to receive the cutter 21.

On the bracket 77, there is secured a crosspiece 79 to receive the clamping screw 80 having a knurled head 81 by means of which the cutter 21 is anchored in the groove 78. At the front of the bracket, there is secured a spring 82 inclined toward the grinding wheel 43, see Fig. 3, which is adapted to receive the cutaway portion 22 of the tool 21 and position it when the screw 81 is pressed down from it, the upper edge of the spring 82 being horizontal and straight.

The arc through which the diamond point 61 passes in the act of truing the edge of the grinding wheel 43 has a radius of about one tenth of the roller 68 to correspond to the movement of the pantographic device.

From the foregoing, it will be seen that when the handle 67 of the arm 62 is manipulated by the attendant to follow the faces 18, 19 and 20 of the master 16, the cutting end of the tool 21 will be brought into engagement with the rotating edge of the grinding wheel 43 to form the clearance edge 18' and the cutting edges 19' and 20'.

The positioning of the cutting end of the tool 21 below the center of the grinding wheel 43, see Fig. 3, will produce the clearance 24 to the rear of the cutting edge 19' of the tool 21 and the inclination of the grinding wheel 43 depending upon its adjustment by the screw 32 will produce the clearance to the rear of the inclined cutting edge 20' of the tool 21. These clearances are predetermined according to the work to be performed, the inclination of the grinding wheel 43 being adjusted as aforesaid by the screw 32 to determine the angle of clearance to the rear of the cutting edge 20' and the position of the cutting end below the center of the grinding wheel 43 determining the angle of clearance 24. The clearance edge 18' will of course be determined by the angle of the face 18 of the master 16.

In order to true the edge of the grinding wheel 43 as aforesaid, it will only be necessary to manipulate the screw 56 to bring the diamond point 61 into engagement with the grinding edge of the wheel 43 while the same is in operation and thereupon to actuate the handle 59 to move the diamond point 61 around this cutting edge.

The embodiment illustrated in Figs. 1 to 3, inclusive is satisfactory for ordinary work, although it will be apparent that no matter how long the arm 73 may be there will always be a slight discrepancy due to the arc described by the tool 21 during the actuation of the pantographic device between the edges 18', 19' and 20' formed on the tool relative to the faces 18, 19 and 20. Of course, in actual operation, allowance will be made for this discrepancy by the attendant.

With the embodiment illustrated in Figs. 6 to 8 inclusive, this arc will be eliminated to produce a reproduction on the tool to correspond more accurately to the faces 18, 19 and 20 of the master 16. This is effected by a tool supporting bracket 77a on a compound slide composed of the block 83 mounted on the standards 84 and 85, the block 83, see Fig. 7 extending above the

path of movement of the pantographic arms 64 and 65.

This block 83 has slidably secured therein the block 86 on which is slidably mounted the tool supporting bracket 77a. In the present instance, the slideway between the block 83 and the block 86 is substantially parallel to the axis of rotation of the grinding wheel 43 and the slot between the slideway 86 and the support 77a is vertical to the slideway between the blocks 83 and 86. Consequently the tool 21 will always be maintained truly perpendicular to the axis of rotation of the grinding wheel 43 and thus any arcuate movement of the tool supporting carrier eliminated. Otherwise the embodiment illustrated in Figs. 6 to 8 inclusive is substantially identical to the embodiment illustrated in Figs. 1 to 3 inclusive.

It is obvious that various changes and modifications may be made to the details of construction without departing from the general spirit of the invention as set forth in the appended claims.

I claim:

1. The combination with a driven grinding wheel, of a supporting platform in a plane extending below the center of rotation of said grinding wheel to support the tool in a line below the center of rotation of said grinding wheel, the plane of said platform forming less than a right angle with the plane of the grinding wheel, and a pantographic device operatively connected to said platform and pivotally mounted to guide said cutting tool through a path of movement reduced as compared to an enlarged guiding pattern.

2. The combination with a grinding wheel, of a base, an adjustable support on said base for positioning said grinding wheel at an angle to the vertical as desired, an enlarged pattern or guide on said base, a pantographic device pivotally connected at one end to said base and free at its other end to follow said enlarged pattern or master, and a carrier for a cutting tool mounted on said pantographic device to be guided in engagement with said grinding wheel through a reduced path of movement as compared to said enlarged pattern or master.

3. The combination with a driven grinding wheel, of a base, a support for said grinding wheel, means for adjusting the inclination of said support in turn to position said grinding wheel at an angle to the vertical as desired, an enlarged pattern or master on said base, a pantographic device pivotally connected at one end to said base and free at its other end to follow said enlarged pattern, and a carrier for a cutting tool mounted on said pantographic device to be carried in engagement with said grinding wheel when carried by said master to follow a reduced path of movement as compared to said master.

4. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a pair of parallel links pivotally connected to said arms, a base on which said grinder is mounted, one of said links being pivotally connected to said base, a master mounted on said base, and a tool holder pivotally connecting the ends of said short arm with said long arm adjacent its outer end, the inner end of said long arm being free to be guided by said master to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master.

5. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a pair of parallel links pivotally connected to said arms, a base on which said grinder is mounted, one of said links being pivotally connected to said base, a master mounted on said base, a guide pivotally connected to one end of said short arm, and a holder for holding a tool in grinding engagement with said grinder mounted on said guide, the free end of said long arm being positioned to be guided by said master to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master.

6. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a pair of parallel links pivotally connected to said arms, a base on which said grinder is mounted, one of said links being pivotally connected to said base, a master mounted on said base, a bar at one end pivotally connected to one end of said short arm, a holder for holding a tool in grinding engagement with said grinder mounted on said bar, and means for guiding the other end of said bar, the free end of said long arm being positioned to be guided by said master to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master.

7. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a pair of parallel links pivotally connected to said arms, a base on which said grinder is mounted, one of said links being pivotally connected to said base, a master mounted on said base, a bar at one end pivotally connected to one end of said short arm, a holder for holding a tool in grinding engagement with said grinder mounted on said bar, and a pin in slidable engagement with a slot formed on the other end of said bar to guide said bar, the free end of said long arm being positioned to be guided by said master to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master.

8. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a pair of parallel links pivotally connected to said arms, a base on which said grinder is mounted, one of said links being pivotally connected to said base, a master mounted on said base, a bracket pivotally connected to one end of said short arm, a support secured to said base, an intermediate slide block slidable on said support, said bracket having a slidable connection with said intermediate slide block, and a tool holder mounted on said bracket, the free end of said long arm being positioned to be guided by said master to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master.

9. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a pair of parallel links pivotally connected to said arms, a base on which said grinder is mounted, one of said links being pivotally connected to said base, a master mounted on said base, a bracket pivotally connected to one end of said short arm, a support secured to said base, an intermediate slide block mounted to slide on said support in a path of movement parallel to the axis of said grinder, said bracket being mounted on said intermediate

slide block to slide in a path of movement at right angles to the path of movement of said intermediate slide block, and a holder for holding a tool mounted on said bracket, the free end of said long arm being positioned to be guided by said master to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master.

10. The combination with a common base, of a journaled bracket mounted on said base, a grinding wheel journaled in said bracket, a support mounted on said base for a cutting tool, a guide mounted on said base, means operatively connected to said support and adapted to be guided by said guide in grinding engagement with said wheel to form the edge desired, and a device for truing the grinding surface of said grinding wheel to correspond to the cutting edge to be formed, said truing device having a cutter, a bracket for said cutter, a horizontal frame in which said bracket is rotatably mounted, said horizontal frame being pivotally mounted on said base and means cooperating with said base for positioning said main frame to bring said cutter into cutting engagement with said grinding wheel.

11. The combination with a common support, of a driven grinding wheel journaled on said support, a pattern on said support, a pantographic device having a single pivotal connection with said support with one end of such device free to follow said pattern, and a carrier for a cutting tool mounted on said pantographic device to be guided in engagement with said grinding wheel, the axis of said grinding wheel being disposed at an acute angle to the path of movement of said pantographic device.

12. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a long link and a short link parallel to one another and pivotally connected to said arms to form a parallelogram, a base on which said grinder is mounted, said long link extending beyond said short arm and being pivotally connected to said base, a master mounted on said base, and a tool holder pivotally connected to the end of said short link where it is connected to said short arm, said long arm extending beyond said short link and cooperating at the end thereof with said master to be guided by said master and in turn to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master.

13. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a long link and a short link parallel to one another and pivotally connected to said arms to form a parallelogram, a base on which said grinder is mounted, said long link extending beyond said short arm and being pivotally connected to said base, a master mounted on said base, a guide operatively connected to said base and operatively connected to the end of said short link where it is connected to said short arm, and a tool holder mounted on said guide, said long arm extending beyond said short link and cooperating at the end thereof with said master to be guided by said master and in turn to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master.

14. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a long link and a short link parallel to one another and pivotally connected to said arms to form a parallelogram, a base on which said grinder is mounted, said long link extending beyond said short arm and being pivotally connected to said base, a master mounted on said base, a guide slidably connected to said base and operatively connected to the end of said short link where it is connected to said short arm, and a tool holder mounted on said guide, said long arm extending beyond said short link and cooperating at the end thereof with said master to be guided by said master and in turn to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master.

15. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a long link and a short link parallel to one another and pivotally connected to said arms to form a parallelogram, a base on which said grinder is mounted, said long link extending beyond said short arm and being pivotally connected to said base, a master mounted on said base, a guide slidably connected to said base and slidably connected to the end of said short link where it is connected to said short arm, and a tool holder mounted on said guide, said long arm extending beyond said short link and cooperating at the end thereof with said master to be guided by said master and in turn to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master.

16. The combination with a grinder, of a pantographic device having a long arm and a short arm parallel to one another, a long link and a short link parallel to one another and pivotally connected to said arms to form a parallelogram, a base on which said grinder is mounted, said long link extending beyond said short arm and being pivotally connected to said base, a master mounted on said base, a support having a guideway fixed to said base, a guide slidably connected in said support and slidably connected to the end of said short link where it is connected to said short arm, and a tool holder mounted on said guide, said long arm extending beyond said short link and cooperating at the end thereof with said master to be guided by said master and in turn to guide the tool carried by said tool holder into grinding engagement with said grinder according to the design of said master

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