Feb. 26, 1935. H. P. TROENDLY 1,992,452

MACHINE FOR GRINDING SPRINGS

Filed June 16, 1930 3 Sheets-Sheet 1

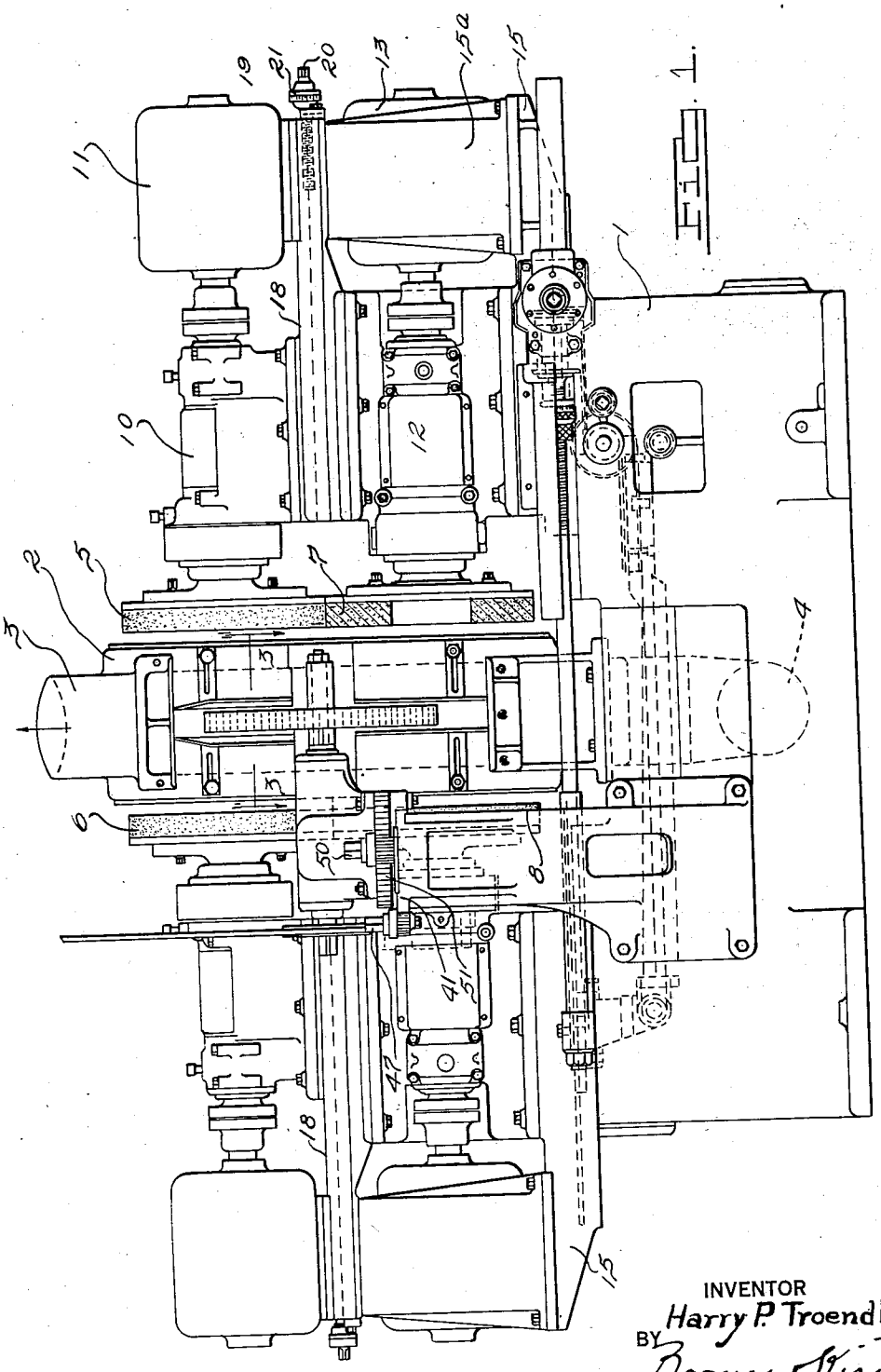


Fig. 1.

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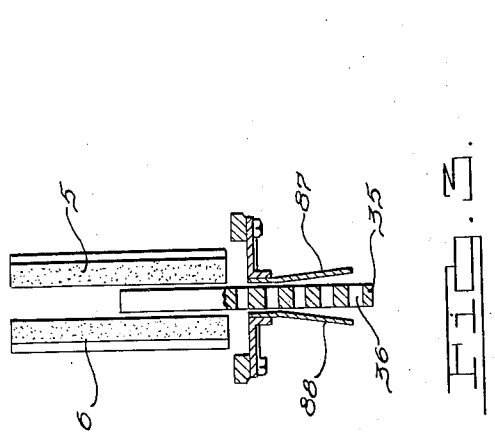


Fig. 5.

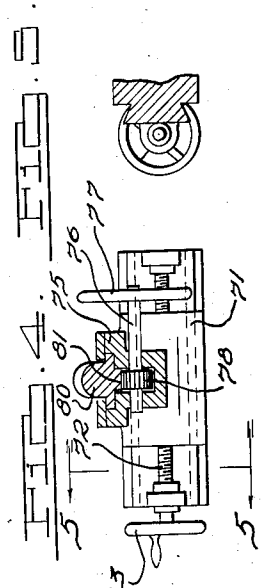


Fig. 4.

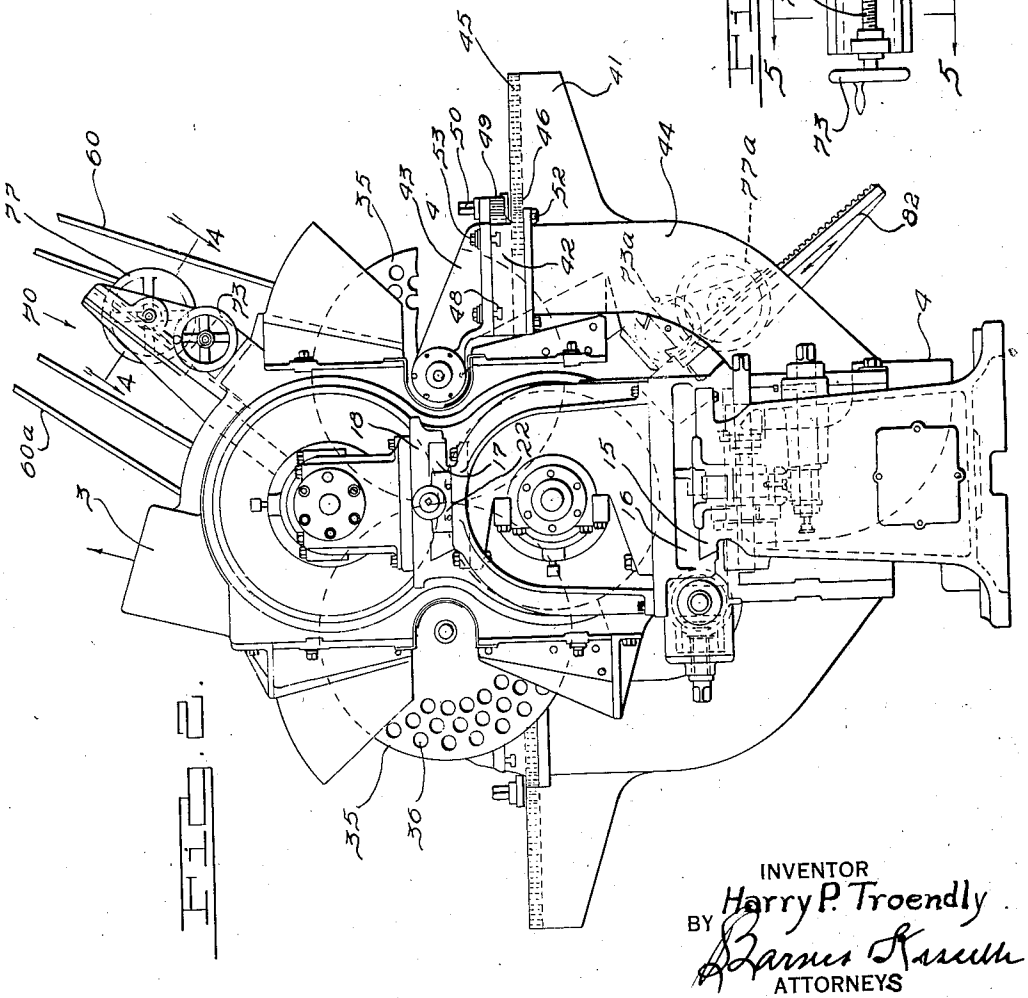


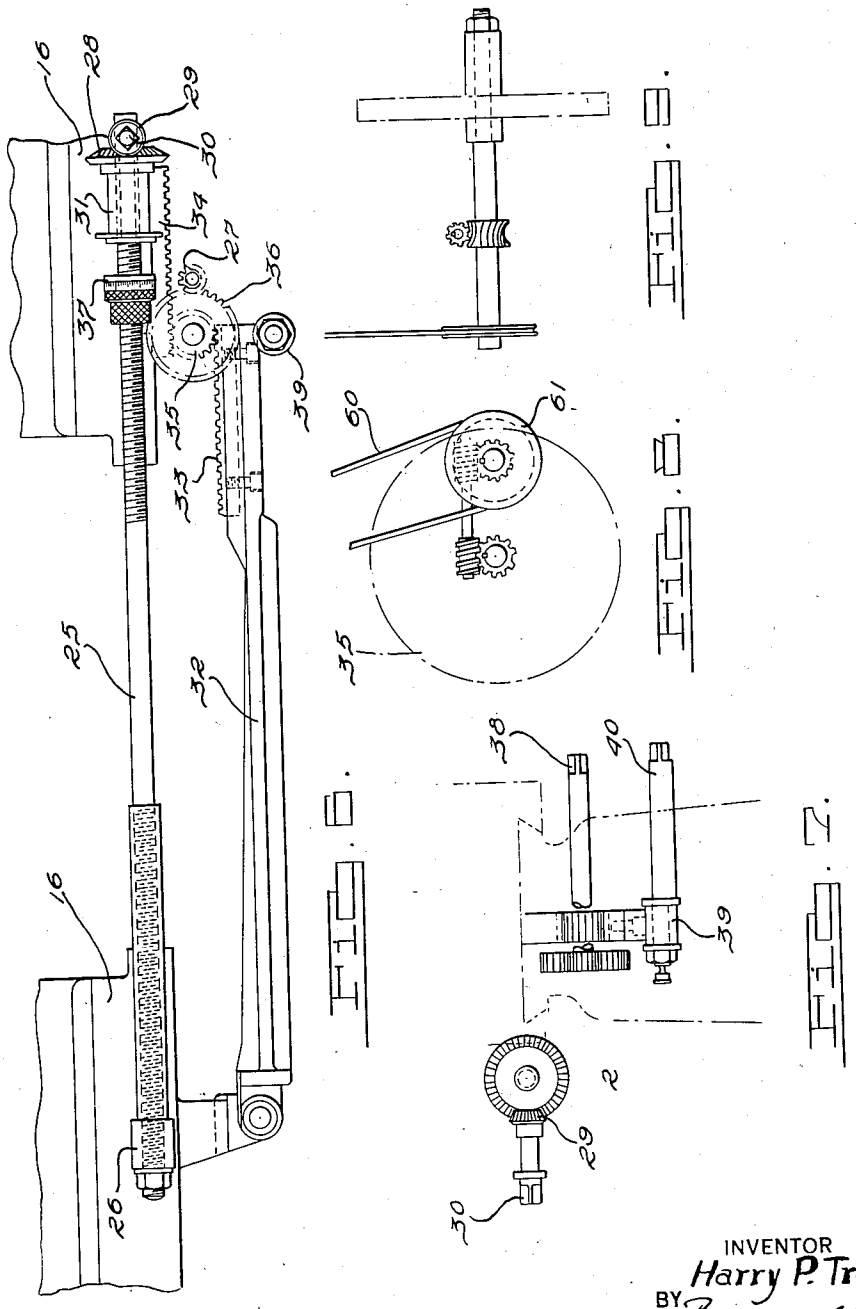
Fig. 2.

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1,992,452

MACHINE FOR GRINDING SPRINGS

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Application June 16, 1930, Serial No. 461,352

9 Claims. (Cl. 51—118)

This invention relates to a machine for grinding springs; it is concerned particularly with a machine for grinding the ends of coil springs so that they are more readily adapted to seat on a surface.

There are quite a number of important features of construction in the machine which will be more readily appreciated from the following detailed description. However, it may be pointed out that the invention is concerned with a machine provided preferably with two sets or pairs of grinding wheels together with suitable holding devices and adjustable mechanism so that the sets may be moved as required, simultaneously or individually. The machine is constructed so that springs to be ground may be fed into the machine from both sides thereof; in other words, the machine is of duplex or double formation so that there may be an operator at each side of the machine. In the form of machine shown, however, the springs fed from both sides of the machine will be acted upon by the same grinding elements; it is to be appreciated, however, that the machine may be operated when springs are being fed but from one side. Other features comprise the mounting of the spring carrier so that it can be properly adjusted on the center line or toward and away from the machine as required, and also guide means are associated with the spring carrier so that springs are properly positioned as they enter between the grinding elements; also exhaust ports, both above and below, are provided for carrying away the dust.

The grinding wheels must needs be dressed from time to time, and the present invention affords means for doing this with the grinding wheels in situ.

Fig. 1 is a side elevation of the machine, illustrating however, some of the parts, including the grinding wheels in section, with the grinding wheels withdrawn from the center housing in which the grinding action takes place.

Fig. 2 is an end elevation thereof.

Fig. 3 is an enlarged section taken on line 3—3 of Fig. 1 showing the spring carrier and grinding wheels.

Fig. 4 is a sectional view taken substantially on line 4—4 of Fig. 2 showing the structure for dressing the grinding wheels.

Fig. 5 is a sectional view taken on line 5—5 of Fig. 4.

Fig. 6 is an enlarged view in illustration of some of the adjusting parts.

Fig. 7 is a view illustrating the position of the parts as seen from the right hand of Fig. 6.

Figs. 8 and 9 are somewhat diagrammatical in form illustrating the spring carrier driver mechanism.

The machine comprises a suitable base 1, situated substantially centrally on which is a housing 2 open at its sides through which the grinding wheels are movable. The grinding action takes place in this housing and the same is provided with exhaust ports 3 and 4, one above and one below, and suitable means (not shown) are employed for effecting a current of air out of these exhaust ports thus to carry away the particles incident to the grinding action.

The grinding wheels are arranged in opposed pairs, one pair being illustrated at 5 and 6, and the other pair at 7 and 8. The grinding wheel 5 is carried by a shaft (not shown) journaled in suitable housing 10 driven by a motor 11. The wheel 7 is similarly mounted on a shaft (not shown) journaled in housing 12 driven by motor 13. The wheels 6 and 8 are similarly mounted.

The grinding wheels 5 and 7 together with their associated elements comprise a unit movable bodily into and out of the housing 2; that is to say, the wheels 5 and 7 are movable into and out of the housing. The base 1 has a support 15 upon which is slidably mounted a supporting table 16 which carries the wheel 7, its motor and shaft. Above the motor 13 is a support 17 upon which table 18 for the motor 11 and wheel 5 is slidably mounted. Support 17 is carried by support 16 by suitable standards 15a. The table 18 may be slidably adjusted on the support 17, and for this purpose a screw 19 is threaded into the same having a square end 20 for the reception of a tool, and a gauge 21. The screw is held stationary to the support 17, as by means of a bracket 22 so that when the screw 20 is rotated the table 18 and all of the parts supported thereby, to wit: wheel 5, its journal mounting 10 and motor 11 are fed toward and away from the housing 2. The corresponding parts on the other side of the machine, namely, the wheel 6 and its associated elements are similarly mounted, and duplicate description is not necessary.

Also, the wheel 8 and its associated parts are mounted for reciprocable adjustment like wheel 7 and its associated parts so that redescription of this need not be made.

In Fig. 6 the structure which interconnects the units on each side of the machine for adjustment purposes is shown. The two supports, or rather tables 16, are interconnected; there is a distance rod 25 fixedly secured to one table 16, as at 26, and screw threaded at its opposite end

having an adjustable stop 27 thereon. Threaded on the rod is a bevel gear 28 meshing with which is a pinion 29 having a projecting shaft shaped as at 30 for the reception of a suitable tool such as a crank. The bevel gear 28, while rotatable, is carried by one table 16, for example—through the means of a sleeve like element 31. A distance rod 32 is connected at one end to one table and the other has a rack 33. A rack 34 is carried by the other of the tables. Both of these racks mesh with an idler gear 35. Mounted on the shaft with the idler 35 is another and larger gear 36 meshing with pinion 37, having an operable shaft 38. A suitable eccentric 39 rotatably adjustable by shaft 40 underlies the end of the distance rod 32 and holds it in mesh with gear 35.

By manually rotating the part 30 through the means of a suitable crank or the like; the bevel gear 28 is fed along the shaft 25 thus spreading or drawing nearer to each other the tables 16. The stop 27 may be positioned to determine the normal distance between the grinding wheels for operation on a spring of a given size so that the two tables 16 may be separated for any purpose, as will later appear and may be returned to normal position determined by the stop 27.

Inasmuch as both tables are slidable, means are provided to impart uniform movement to each table in such manner as to prevent one table from sticking, and all movement taking place in one table. This is accomplished by the gear and rack arrangement above described. In making an adjustment the gear 35 rotates, and in so doing imparts uniform reciprocable movement to both the racks 34 and 33 so that the total amount of adjusment is equally divided between the two halves of the machine. It may sometimes be desirable to quickly open a machine, and by opening, I mean withdrawing the grinding wheels from the housing 2, as shown in Fig. 2, and to do this the shaft 38 may be rotated; it will be appreciated that this results in a faster adjusting action than an adjusting action through the threaded rod 25.

Accordingly, it will be noted that by a single adjustment the two pairs of opposing grinding wheels and their associated elements may be withdrawn from the housing 2, or may be adjustable into the housing for grinding purposes; that, furthermore, the wheels 5 and 6 are independently and separately adjustable.

The springs which are ground are carried by what are termed "Ferris" wheels 35, one mounted on each side of the machine, and each having a plurality of openings 36 in which the springs are placed, one spring to each opening. These wheels are suitably journaled and in their rotation carry the springs in between grinding wheels, as illustrated in Fig. 3. Preferably, the machine is provided with inclined wings 87 and 88 which engage the ends of the springs so as to center them. An operator stands on each side of the machine and keeps the holes 36 filled with springs; each time the operator pushes in a new spring, a finished spring is pushed out.

The Ferris wheel attachment is so mounted that it is capable of quick adjustment as regards the center line of the machine, or towards and away from the axis. In this regard both sides of the machine are similar so that only one need be described. Supporting brackets 44 are employed having a sort of table 41 near the top which carries a base 42 upon which bracket 43 is mounted. The Ferris wheel is journaled in the bracket as shown. The base 42 is adjustable toward and away from the machine. This is accomplished by providing the table 41 with a rack 45 and mounting a gear 46 on the base 42, rotatable by applying a tool to the end of its shaft, as illustrated at 47. It will readily be seen that by turning the part 47 the base 42 is moved along the table 41. Thus the Ferris wheel supporting structure is easily withdrawn to permit change of wheels to accommodate for the different sizes of springs. The bracket 43 is slidably carried on base 42, as by means of ways 48, and bracket 43 has a gear 49 turnable by engagement with part 50, and the gear 49 meshes with rack 51. Thus the wheel is quickly adjustable to the center line. After adjustment is made, the parts are then securely held in position by clamping screws 52 and 53.

The wheels are driven and this may be accomplished by means of a belt 60 running over pulley 61, which in turn is connected to the wheels through the gear reducing worms and worm gears shown in Figs. 8 and 9. Preferably, the wheels are separately driven, as indicated by the belts 60 and 60*a* (Fig. 2) so that only one wheel may be operated if desired. Obviously, a very small amount of power is required to drive the wheels, especially inasmuch as there is a great gear reduction and the wheels move relatively slowly.

Dresser units are provided for dressing each pair of grinder wheels. For the upper pair there is a unit generally illustrated at 70. This is shown in more detail in Fig. 4 wherein the unit is shown as comprising a holding block 71 mounted on a screw 72 rotatable by a wheel 73. By this construction the holding block may be moved axially as regards the machine to center it. A guideway device 75 is carried by the holding block, and journaled therein is a shaft 76 having a hand wheel 77 on one end and a gear 78 on the other. A slidable device 80 is carried by guideway 75, and it has a rack 81 which meshes with a gear 78.

To dress the wheels a suitable dresser (not shown) is carried by the device 80 and through the means of rotating the wheel 77 it is fed down into the space between the wheels 6 and 5. It will be understood that the wheels 6 and 5 may be opened up somewhat at this time. The lower wheels may be dressed by a similar dressing unit generally referenced 82 and comprising, generally, the same details of construction as the one just described; in this regard it has a hand wheel 77*a*, and a centering wheel 73*a*, and other similar associated parts.

Accordingly, it will be noted that a machine advantageous from a number of standpoints, is provided. In operation, its output is doubled because springs may be fed from both sides. The use of the two sets of grinding wheels makes it possible to have one set first accomplish a rough grinding job and the other set a finishing job. A nicety of adjustment is provided; this results not only because each side unit may be adjusted in and out, but because the individual wheels thereof may be adjusted with respect to each other.

I claim:—

1. A spring grinding machine comprising a base, superimposed grinding wheels each having its own motor, means for adjusting simultaneously said wheels and motors axially, means for adjusting individually one wheel and its motor

axially, and another set of superimposed wheels substantially similar to the above mentioned superimposed wheels and disposed in opposing relation to the said described wheels.

2. A spring grinding machine comprising opposed grinding wheels, a rotatable spring carrying wheel for carrying springs between the opposed grinder wheels, means for supporting the spring carrying wheel, means for adjusting the support in an axial direction for centering the carrying wheel, and means for moving the support perpendicular to the axis for removing the spring carrying wheel from between the grinder wheels.

3. A spring grinding machine comprising opposed grinding wheels, a rotary wheel for carrying springs between the grinder wheels, a bracket for supporting the spring carrying wheel, a gear and rack for adjusting the bracket axially, a table for the support, and a gear and rack for moving the table substantially perpendicular to the axis for removing the spring carrying wheel from between the grinder wheels.

4. A spring grinding machine comprising in combination, a support, a housing positioned substantially centrally on the support having its opposite sides open, a pair of grinding wheels on the support positioned on one side of the housing, another pair of grinding wheels on the support positioned on the other side of the housing, a motor for each grinding wheel, guideways upon which each grinding wheel and its motor are mounted, means for shifting the two grinding wheels on either side of the housing to retract them out of the housing through the open side thereof and for positioning the grinding wheels in the housing through the open sides thereof, and means for moving one of the two grinding wheels on either side of the housing axially relative to the other.

5. A grinding machine, comprising means for moving pieces of work to be ground, a plurality of pairs of axially spaced rotary grinding wheels with the wheels of each pair disposed on opposite sides of the work and adapted to grind the same, a driving motor for each grinding wheel, the axes of the grinding wheels being disposed substantially transverse to the plane of movement of the work, a movably mounted support for each grinding wheel and its motor, means for simultaneously moving axially the supports with their grinding wheels and motors, and other means for moving axially one support with its motor and grinding wheel with respect to the other supports, their motors and grinding wheels.

6. A grinding machine, comprising means for moving pieces of work to be ground, a plurality of rotary grinding wheels positioned on one side of the work, the movement of the work being in a plane substantially transverse to the axes of said grinding wheels, means for simultaneously moving the said grinding wheels axially, means for independently moving one grinding wheel axially, a plurality of grinding wheels positioned on the opposite side of the work, the movement of the work being in a plane substantially transverse to the axes of said second mentioned grinding wheels, means for simultaneously moving the said second mentioned grinding wheels axially, and means for independently moving one of the said second mentioned grinding wheels axially.

7. A grinding machine, comprising a rotary work carrier, a plurality of rotary grinding wheels grouped on one side of the carrier, the axes of the grinding wheels substantially paralleling the axis of the carrier, a plurality of grinding wheels grouped on the opposite side of the carrier, the axes of the second mentioned group of grinding wheels substantially paralleling the axis of the carrier, means for moving simultaneously all of said grinding wheels relative to the carrier with movement in the direction of the extent of their axes, means for moving one grinding wheel of the first mentioned group axially independently of other grinding wheels, and means for moving one grinding wheel of the second mentioned group axially independently of other grinding wheels.

8. A grinding machine, comprising means for moving work to be ground, a plurality of rotary grinding wheels on one side of the work, a plurality of rotary grinding wheels on the opposite side of the work, a driving motor for each grinding wheel, the axes of the grinding wheels being disposed substantially transverse to the plane of movement of the work, means for simultaneously moving axially all of the grinding wheels on one side of the work and all of the grinding wheels on the opposite side of the work, and other means for moving and positioning axially one grinding wheel on one side of the work with respect to the other grinding wheels.

9. A grinding machine, comprising means for moving work to be ground, a plurality of rotary grinding wheels on one side of the work, a plurality of rotary grinding wheels on the opposite side of the work, a driving motor for each grinding wheel, the axes of the grinding wheels being disposed substantially transverse to the plane of movement of the work, a movably mounted support for each grinding wheel and its motor, means for simultaneously moving axially all of the supports with their grinding wheels and motors, and other means for moving and positioning axially one support with its motor and grinding wheel with respect to the other supports, their motors and grinding wheels.

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