Oct. 5, 1937. G. D. MOOMAW 2,095,202

GRINDING AND POLISHING MACHINE

Filed June 17, 1935 4 Sheets-Sheet 1

FIG. 1

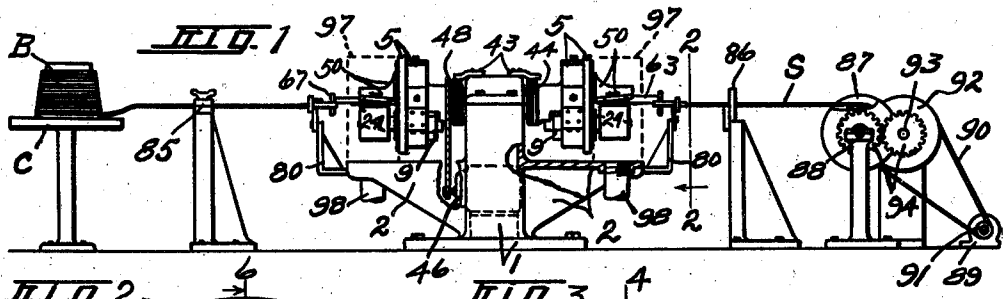


FIG. 2.

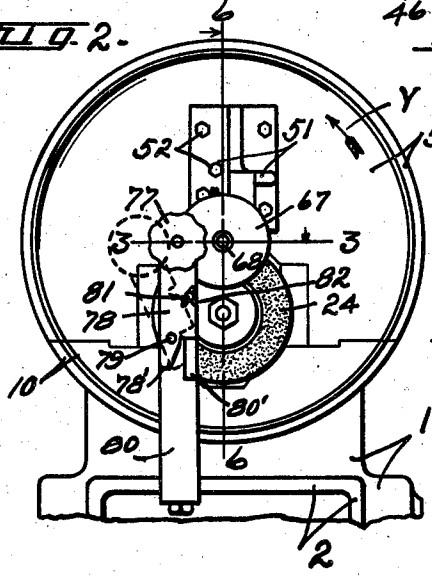


FIG. 3.

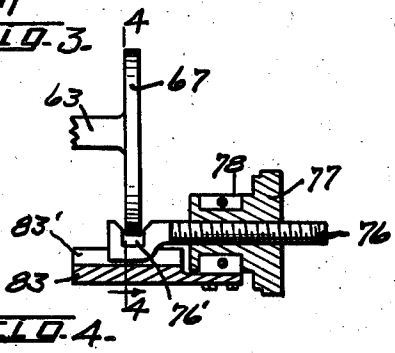


FIG. 4.

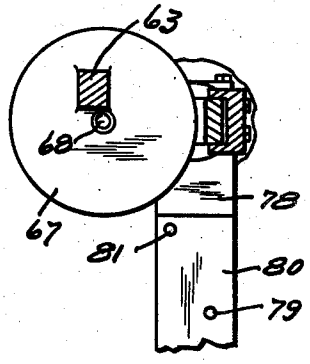
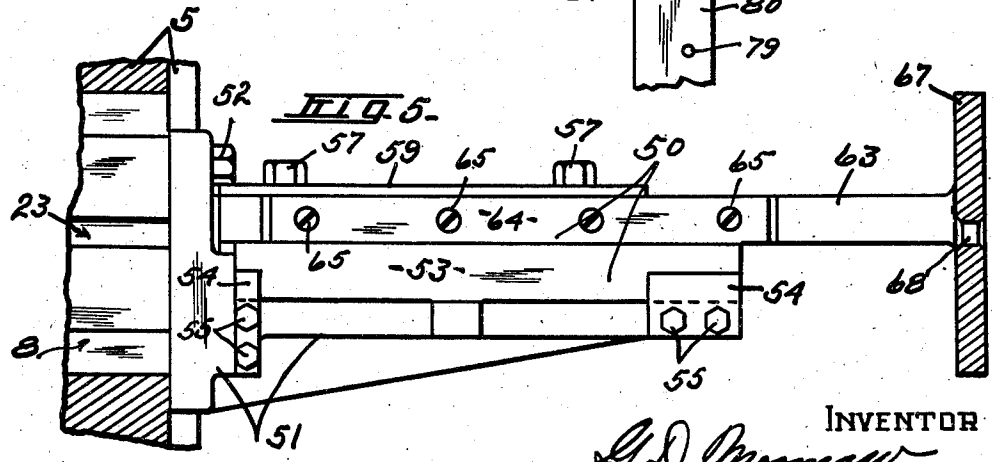


FIG. 5.



INVENTOR

G. D. Moomaw

WITNESS

J. T. Mains

BY

Theodore E. Simonton

ATTORNEY

Oct. 5, 1937. G. D. MOOMAW 2,095,202

GRINDING AND POLISHING MACHINE

Filed June 17, 1935 4 Sheets-Sheet 2

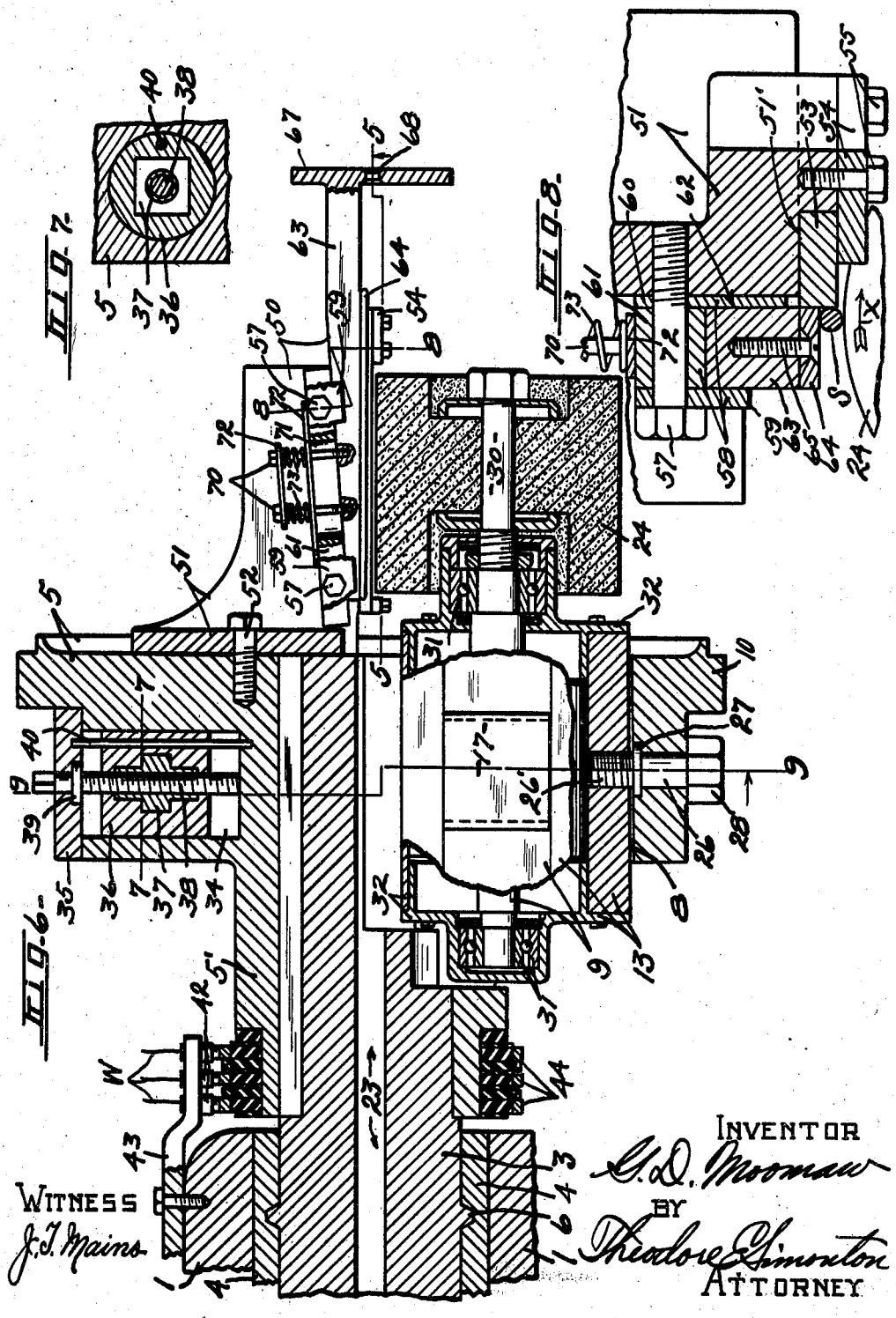


FIG. 7.

FIG. 8.

FIG. 6.

INVENTOR
G. D. Moomaw
BY
Theodore Simonton
ATTORNEY

WITNESS
J. J. Mains

Oct. 5, 1937. G. D. MOOMAW 2,095,202

GRINDING AND POLISHING MACHINE

Filed June 17, 1935 4 Sheets-Sheet 3

FIG. 9.

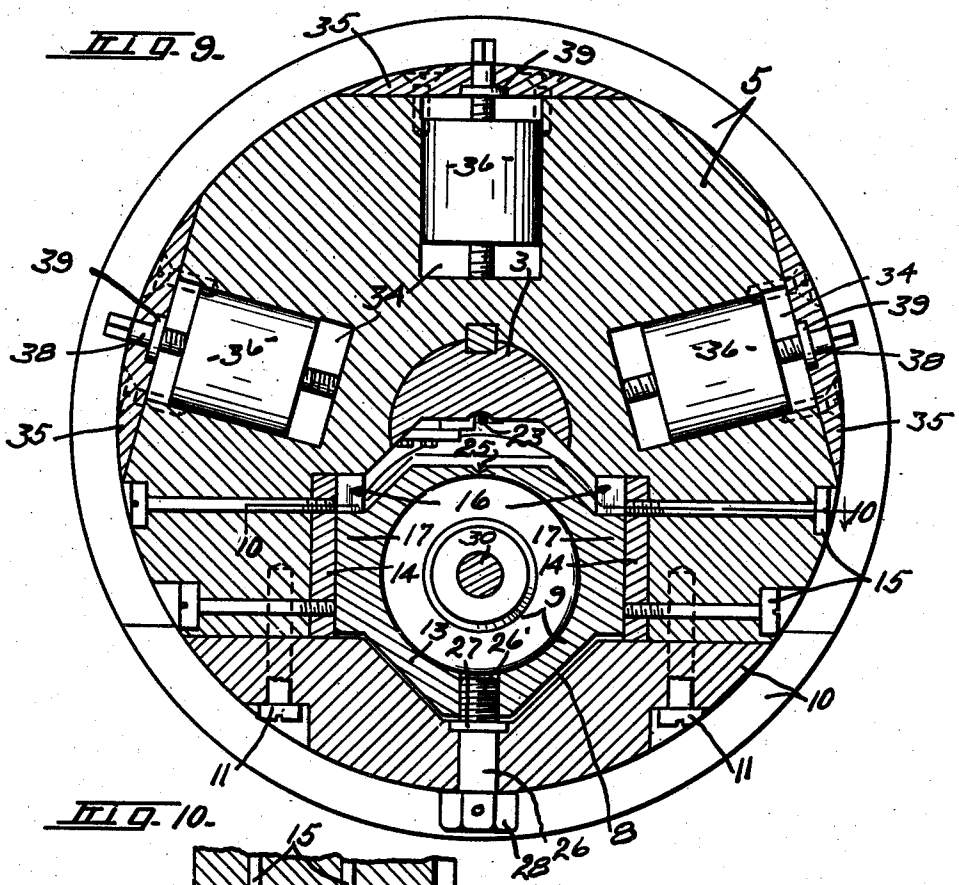
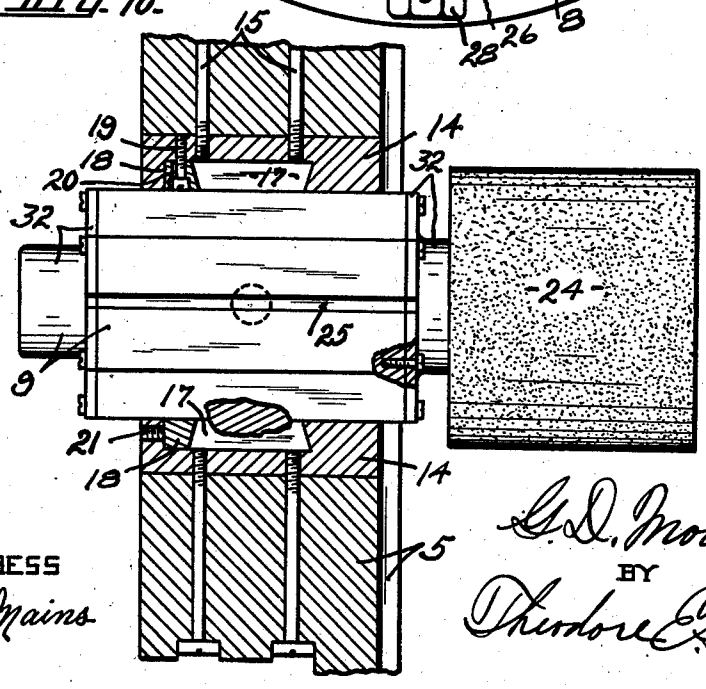


FIG. 10.



WITNESS
J. J. Mains

INVENTOR
G. D. Moomaw
BY
Theodore E. Simonton
ATTORNEY

Oct. 5, 1937. G. D. MOOMAW 2,095,202

GRINDING AND POLISHING MACHINE

Filed June 17, 1935 4 Sheets-Sheet 4

FIG. 11.

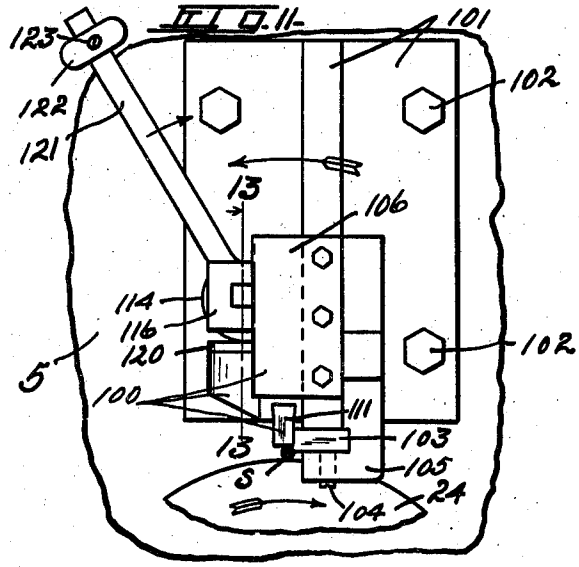


FIG. 12.

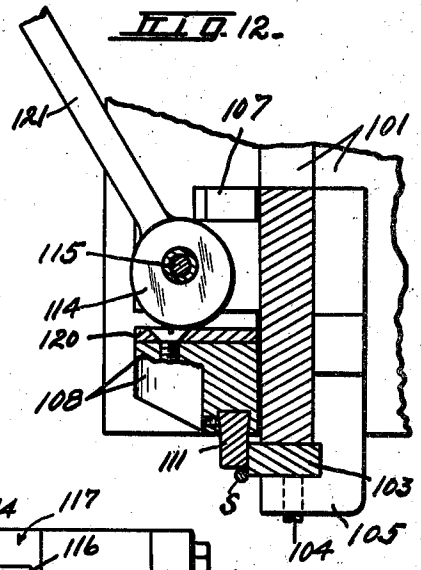


FIG. 13.

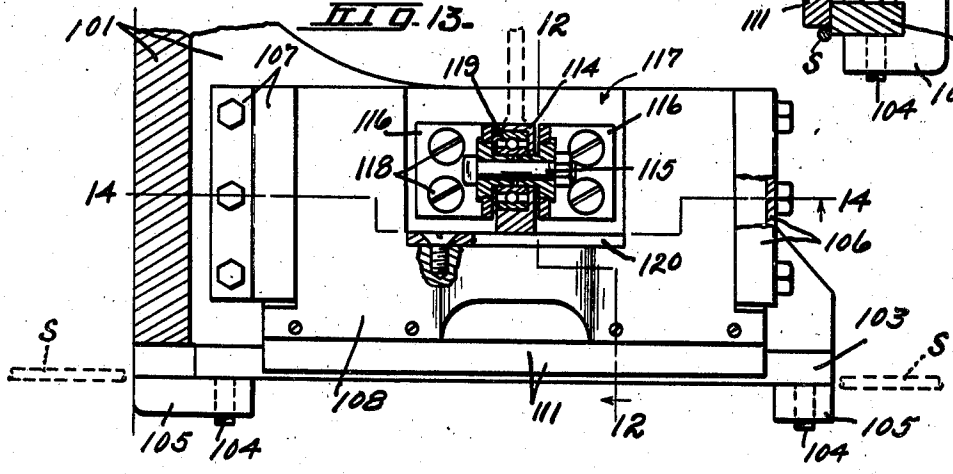
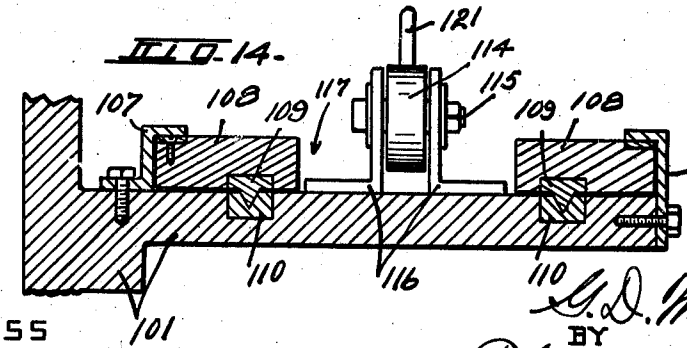


FIG. 14.



WITNESS
J. J. Mains

INVENTOR
G. D. Moomaw
BY
Theodore C. Simonton
ATTORNEY

Patented Oct. 5, 1937 2,095,202

UNITED STATES PATENT OFFICE

2,095,202

GRINDING AND POLISHING MACHINE

George D. Moomaw, Syracuse, N. Y., assignor, by mesne assignments, to Crucible Steel Company of America, New York, N. Y., a corporation of New Jersey

Application June 17, 1935, Serial No. 26,913

11 Claims. (Cl. 51—90)

This invention relates to improvements in grinding and polishing machines in which an abrasive tool is simultaneously rotated about its axis and revolved about the work in pressure engagement therewith and is an improvement over the structure shown in my pending application Serial No. 579,745, filed December 8, 1931, now Pat. No. 2,009,452, (51—137) granted July 30, 1935.

The main object of this invention is to provide a grinding or polishing machine in which an abrasive tool is operated at high speed for the purpose of producing a very high polish upon the work in a minimum period of time.

In carrying out the above mentioned object I have mounted the abrasive or polishing tool upon a rotating head having an opening co-axial therewith for the reception of the work, and at one side of the axis of rotation of said head. The abrasive or polishing tool is provided with means for rotating the same about its axis and additional power means is provided for rotating the head and thereby to revolve the abrasive or polishing tool about the work simultaneously with the rotation of the tool upon its own axis, while in operative engagement with the work.

Another object of the invention is to provide a grinding or polishing machine of the above mentioned class with means for adjusting the abrasive or polishing tool relative to the head toward and from the work.

A further object of the invention is to provide adjustable means associated with the head for counterbalancing the abrasive or polishing tool and the drive means therefor.

A still further object of the invention resides in providing means for adjusting the work toward the abrasive or polishing tool during the operation of the tool.

Still another object is to provide a machine of the above mentioned class with means for automatically maintaining the work in cooperative relation with the abrasive tool as said tool is decreased in diameter during the use thereof.

Another object is to produce an apparatus which is durable, simple and economical in construction and which may be quickly and easily adjusted for work having different diameters and which is composed of different grades of materials.

Other objects and advantages pertaining to the detail structure of the device will more fully appear from the following description taken in connection with the accompanying drawings in which;

Figure 1 is a side elevation of an apparatus embodying the various features of this invention with portions thereof broken away and in section to illustrate the underlying parts.

Figure 2 is an end elevation as viewed substantially from line 2—2, Figure 1.

Figure 3 is a detail horizontal sectional view taken on line 3—3, Figure 2.

Figure 4 is a vertical sectional view taken on line 4—4, Figure 3.

Figure 5 is a horizontal detail sectional view taken on line 5—5, Figure 6.

Figure 6 is a vertical sectional view through one of the abrasive tools, the carrier head for said tool and the adjacent end of the support or standard taken substantially in the plane of the line 6—6, Figure 2.

Figures 7 and 8 are detail sectional views taken respectively on lines 7—7 and 8—8, Figure 6.

Figure 9 is a transverse sectional view of one of the carrier heads taken substantially on line 9—9, Figure 6.

Figure 10 is a detail sectional view taken on line 10—10, Figure 9.

Figure 11 is a fragmentary end view similar to Figure 2 and illustrating a modified form of work supporting means which is adapted to automatically maintain the work in cooperative engagement with the abrasive wheel during the operation of the wheel.

Figure 12 is a sectional view taken on line 12—12, Figure 13.

Figure 13 is a detail sectional view taken on line 13—13, Figure 11.

Figure 14 is a sectional view taken on line 14—14, Figure 13.

The device, as illustrated in Figures 1 to 10 inclusive, comprises a standard 1 formed with a pair of horizontally disposed shelf portions 2, arranged one at either side of the standard 1. A shaft 3 is journaled in the upper end of the standard 1 in suitable bearings 4 composed, in this instance, preferably of bronze. The shaft 3 has the ends thereof extending outwardly beyond the sides of the standard 1, and has secured thereto a respective supporting head 5. Any suitable means may be provided for maintaining the shaft 3 against axial movement in the standard 1 and, for this purpose, the shaft is provided with a pair of axially spaced annular flanges 6, one of which is shown in Figure 6, positioned in corresponding recesses provided in the bearing member 4.

Each head 5 may be secured to the respective end of the shaft 3 by any suitable means where-

by said shaft and head will move in unison. The heads 5 are constructed alike and each is provided with an axially disposed opening 8 for the reception of a motor 9. One side of the head is formed with a cap 10 adapted to form an outer wall of the opening 8, as illustrated in Figure 9, and which is removably secured to the major portion of the head by screws 11. The opening 8, in this instance, is substantially octagon in cross section and is of greater width radially than the corresponding transverse width of the case 13 of the motor 9 which is also formed octagonal in cross section similar to the opening 8. The transverse width of the opening 8 is also greater than that of the motor case 13 and a pair of guide blocks 14 are mounted in the opening, one adjacent either transverse side thereof.

The guide blocks are maintained in fixed relation in said opening by screws 15, as shown in Figures 9 and 10. The inner face of each guide block 14 is provided with a longitudinal guide recess 16 for the reception of a guide lug or way 17, provided on opposed side faces of the motor case 13. The guide ways 17 are dovetail in cross section and of less width than that of the recesses 16. Each guide way 17 is slidably secured in a corresponding guide recess 16 by a gib 18, which is secured to the corresponding guide block 14 by screws 19.

The openings, as 20, in each gib 18, for the screws 19, are elongated transversely of the gib so that said gib may be adjusted laterally to take up wear and maintain the guide ways in close sliding relation with the corresponding guide block. Screws, as 21, Figure 10, may be provided in each guide block 14 for effecting the lateral movement of the gibs 18 toward the corresponding guide ways 17 when the screws 19 are loosened.

The inner side of the opening 8 is extended into the adjacent side of the shaft 3, as shown in Figure 9, so that the inner wall of said opening extends diametrically through the axis of said shaft. The shaft 3 is provided with a central longitudinally extending opening 23 for the reception of the wire stock, as S, to be ground or polished, and this opening is preferably of considerably greater diameter than that of the stock to not only permit the free axial movement of the stock through the opening, but to also provide for the lateral movement of the stock in said opening to a certain degree toward the grinding wheel 24 connected with the motor 9.

The inner face of the motor case 13 is provided with an axially disposed inwardly extending groove or channel 25, as shown in Figures 9 and 10, which extends nearly completely through said wall of the case, and is in alignment with the shaft opening 23 so as to receive the stock S therein when the motor case is moved to its innermost position, as the abrasive wheel 24 decreases in diameter by wear and thereby provides for the maximum use of each abrasive wheel before replacement is necessary. The motor 9 and the abrasive wheel 24 carried thereby are moved radially to obtain the proper adjustment of the wheel 24, relative to the stock S by means of a screw stud 26 which is journaled in the cap 10, and has the inner end 26' thereof screw-threaded in a suitable aperture provided in the outer wall of the case 13, as clearly illustrated in Figures 6 and 9. The stud 26 is provided with an outwardly extending annular flange 27 formed on the periphery thereof adjacent the threaded portion 26', and is mounted in a suitable annular recess provided in the inner face of the cap 10. The outer end of the stud 26 extends a short distance beyond the cap 10 and has secured thereto an hexagonal head 28 which not only provides means whereby the stud may be rotated to effect radial adjustment of the motor case 13, but also co-acts with the flange 27 for preventing axial movement of the stud relative to the cap 10 during the rotation thereof.

As shown in Figure 6, the armature shaft of the motor 9 is journaled in rolling bearing members 31, mounted in the end members or caps 32 of the case 13. One end of the armature shaft 30 extends outwardly beyond the case 13 and head 5, and has mounted thereon, in any suitable manner, as hereinbefore mentioned abrasive wheel 24.

As shown in Figures 6 and 9, the head 5 is provided with a plurality of, in this instance, three substantially cylindrical recesses 34 arranged in uniform circumferential spaced relation at the opposite side of the head to that in which the motor 9 is mounted, and which extend radially inwardly from corresponding flattened sides of said head. Cap members 35 are secured to the head by screws or their equivalents to close the outer ends of a respective recess 34. In each recess 34 is mounted a counterweight 36 composed preferably of lead and which, as shown in Figure 7, is cylindrical in form. Cast within each weight 36 is a metallic bushing 37 having the interior thereof provided with screw threads for the reception of a respective adjusting screw 38.

Each of the screws 38 extend centrally into a respective recess 34 with the inner end thereof in contact with the inner end wall of the recess. Each screw is provided with an outwardly extending annular flange 39 which is positioned in a corresponding recess provided in the inner face of the respective cap 35 for maintaining the screw against outward axial movement. The outer end of each screw preferably extends a short distance beyond the corresponding cap 35, and is flattened or squared for the reception of a wrench by which the screw may be turned.

A retaining pin 40 is mounted in each recess 34 at one side of the screw 38 and is slidably received in a suitable longitudinally disposed hole provided in the weight 36, as shown in Figures 6 and 7, for maintaining the weight against rotary movement during the turning of the screw and, at the same time, permit free axial movement of said weight in the recess.

It will now be observed that as the motor 9 is adjusted toward and from the axis of rotation of the shaft 3 by the manipulation of the screw 26 to bring the abrasive wheel 24 into proper engagement with the stock passing through the shaft opening 23, the weight of said motor and wheel may be readily counterbalanced by the proper manipulation of the screws 38 and the weights 36 connected therewith, and thereby maintaining a smooth operating machine which will function with the minimum amount of vibration.

The motors 9 may be of any suitable type or construction adapted to revolve at uniform constant speed and, for this purpose, I preferably use two-pole, three-phase, 50 to 60 cycle, 220 volt alternating current motors which, as is obvious, will run at a constant speed at a given frequency and with a minimum amount of vibratory move-

ment. It is preferable that the speed of these motors be changed from time to time during the operation thereof inasmuch as the wire stock with which this machine is particularly adapted to be used, often varies in degree of hardness throughout the length thereof and it will be readily understood, the change in the speed of the motors of this type is readily accomplished by changing the frequency of the current supplied to said motors.

I, therefore, preferably supply current to the motors 9 from a generator which in turn is driven by a suitable electric motor, the current for which is controlled by a rheostat or other suitable means positioned in the electric circuit for the motor. This generator motor and rheostat are not shown, but it is to be understood that they may be provided in the same manner as that shown and described in my hereinbefore mentioned co-pending application.

In order that the circuit may be continuously supplied to the motors 9 during the rotation of the supporting heads 5, I connect the wires as W, Figure 6, leading from the source of potential, as the above-mentioned generator, to respective brushes 42 provided for each motor and which are carried, by a suitable brush-supporting arm 43 secured to the standard 1. The brushes 42 which, in this instance are three in number, are maintained by the arms 43 in operative engagement with respective collector rings 44, mounted in electrically insulated spaced relation upon an inwardly projecting hub 5' associated with each head 5, as shown in Figure 6.

Each set of collector rings 44 may be electrically connected with a respective motor 9 by any suitable well-known means which is believed to be not necessary to herein further illustrate or describe.

The heads 5 are rotated independently of the operation of the motors 9, in this instance, by an electric motor 46 mounted in any suitable manner in the standard 1 as illustrated by broken lines in Figure 1. The armature shaft of the motor 46 is extended outwardly a short distance beyond one side of the standard 1 and connected with the head 5 at the corresponding side of the standard by means of sprocket wheels secured respectively to the armature shaft and to the hub 5' and a suitable chain belt, as illustrated at 48, Figure 1.

Each head 5 has operably connected therewith one of my novel work holders 50 for maintaining the stock as S in pressure engagement with the periphery of the abrasive wheel 24 during the operation thereof. Each of these work holders 50 comprises a supporting bracket 51 which is secured at one end thereof as by screws 52 to the outer side face of a respective head 5 at the diametrical opposite side thereof to that of the abrasive wheel 24.

The bracket 51 extends outwardly from the head 5 over the corresponding wheel 24 and has the inner or forward side thereof arranged in slightly spaced parallel relation with a diametrical plane passing through the axis of the head 5 and motor 9, as indicated in Figure 8. The inner, forward edge of the bracket 51 is provided with a recess 51' which extends longitudinally of the bracket 51 in parallel relation with the axis of the shaft 3 and head 5.

Mounted in the recess 51' is a work holding plate 53 composed preferably of tempered steel and which is clamped therein by retaining plates 54 secured to the lower surface of the bracket 51 by screws 55, as shown in Figures 5 and 8. The holding plate 53 is preferably of such a width that the outer or forward longitudinal edge thereof terminates from the diametrical plane passing through the axes of the shaft 3 and motor 9 a distance substantially equal to one half the diameter of the stock S so as to maintain said stock substantially co-axial with the head 5 in fixed pre-determined relation with the wheel 24 and thus prevent the stock being moved laterally by said wheel during the rotation thereof. It will be understood that the wheel 24 is so rotated that the peripheral surface thereof engaging the stock S will travel toward the work holding plate 53, as indicated by the arrow X in Figure 8.

Secured by bolts or screws 57 to the side of the bracket 51 adjacent the holder plate 53, is a guide member 58 which, in this instance, comprises a pair of side plates 59 and 60 and an intermediate spacing block 61. The side plates 59 and 60 extend downwardly toward the axis of rotation of the head 5 a short distance below the spacing block 61 to form a guide channel 62 for the reception of a pressure bar 63 which is slidably mounted for longitudinal movement in said channel.

The guide member 58 is secured to the bracket 51 at an acute angle to the axis of rotation of the head 5, in Figure 6, while the upper or outer longitudinal face of the pressure bar 63 is correspondingly tapered so that when the bar is in the channels 62 the lower or inner longitudinal surface of the bar is maintained in parallel relation with the axis of rotation of the head 5, and therefore with the stock S and the adjacent periphery surface of the wheel 24. The lower longitudinal surface of the pressure bar 63 is preferably provided with a wear plate 64 which is removably secured to the bar by a plurality of screws 65, one of which is shown in Figure 8. The wear plate 64 is preferably rectangular in cross section and I preferably provide holes therethrough for the screws 65 having opposite ends countersunk so that either side surface of the plate may be positioned for engagement with the stock S, and thereby provide for maximum use of the plate. The wear plate 64 is of greater length than the width of the wheel 24 so that said plate will be in engagement with the full length of the stock S contacted by the wheel 24 throughout the range of adjustment of the bar 63.

The pressure bar is extended outwardly beyond the outer end of the wear plate a short distance and has the outer end thereof provided with a circular plate or head 67 which may be secured thereto or be made integral therewith. This plate or head 67 is in co-axial alignment with the shaft 3 and has a central opening 68 therethrough for the reception of the stock S. Each bar 63 is slidably maintained in the channel 62 by means of a pair of retaining screws 70 which are screw threaded in the bar 63 in longitudinal spaced relation and extend outwardly therefrom through an elongated slot 71 provided in the spacing block 61 intermediate the screws 57. Mounted on the screws 70 in engagement with the head thereof is a retaining plate 72, and a spring 73 is mounted on each screw between the plate 72 and a second retaining plate 72 also mounted on said screws and positioned in engagement with the upper face of the spacing block 61. The length of the slot 71 is sufficient to permit the maximum adjustment of the bar 63 in the guide 58 and the bar is manually moved longitudinally in the guide 58 by means of an

adjusting screw 76 and a hand-nut 77 screw threaded on said screw.

The screw 76 has one end portion thereof provided with a recess 76' which extends inwardly from one side thereof and is substantially the same width as the head 67 for receiving said head therein. The hand-nut 77 is rotatably mounted in the upper end of an arm 78 which is pivotally connected near its lower end, as at 79, to the upper end of a bracket 80 secured to the adjacent shelf 2. The lower end of the arm 78 below the pivot 79 is somewhat reduced in width to form a stop member 78' adapted to engage a shoulder or flange 80' provided on the upper end of the bracket 80 for limiting the outward movement of the arm. The arm 78 is maintained in its normal upright position by means of a thumb screw 81 mounted in the upper end of the bracket 80 above the pivot 79 and which is normally received in a suitable slot or recess 82 provided in the adjacent longitudinal edge of the arm 78.

The pivotal movement of the arm 78 is sufficient to bring the adjusting screw 76 out of holding engagement with the head 67 and the hand-nut 77 out of the path of movement of said head, whereby the bar 63 may be readily withdrawn from the guide 58 after the retaining screws 70 have been removed therefrom. The adjusting screw 76 may, as shown more clearly in Figure 3, be supportably maintained in engagement with the head 67 by means of a supporting shoe 83 secured to the upper end of the arm 78 and which has the face thereof adjacent the head 67 provided with a longitudinally disposed groove or channel 83' adapted to slidably receive the adjacent end of the screw 76 therein.

The operation of the machine will now be readily understood to be as follows:

The wire or stock S may, as illustrated in Figure 1, be unwound from a spool B carried on a revolving reel C and threaded through a tension block 85 of any suitable construction positioned preferably adjacent the inlet end of the machine and thence through the opening 68 in the adjacent head 67 then through the opening 23 in the shaft 3, after which the stock is passed through the opening 68 in the head 67 and a guide member 86 positioned adjacent the outlet end of the machine and then to a take-up drum 87 mounted on a shaft 88. The shaft 88 may be driven in any suitable manner as from a motor 89 connected therewith by a belt 90 passing around a drive pulley 91 on the armature shaft of the motor and a pulley 92 secured to a shaft 93 which, in turn, is operably connected with the drum 87 by means of a pair of gears 94, one of which is secured to the shaft 88 and the other one is secured to the shaft 93, in any suitable manner.

After the stock has thus been positioned, each abrasive wheel 24 is moved radially relative to the head 5 by the manipulation of the screw 28 to bring the peripheral surface thereof into contact with the stock S which, it will be understood, is maintained in co-axial relation with the shaft 3 and heads 5 by the tension block 85 and guide 86 which have openings therethrough arranged in alignment with the axis of the shaft 3. After the wheels 24 and motors 9 connected therewith have thus been adjusted, the counterbalance weights 36 are then adjusted by the manipulation of the screws 38 for balancing the heads so that the same will rotate with a minimum amount of vibratory movement.

After the motor and weights have thus been adjusted, the pressure bars 63, which had previously been moved to their outermost positions, are moved inwardly to bring the wear plates 64 into contact with the adjacent portions of the stock S.

It is now obvious that by starting the motor 89, the wire or stock S may be steadily drawn through the shaft 3 across the peripheral faces of the abrading wheels 24 at a uniform rate of speed. The motors 9 and 46 may now be started which will cause the wheels 24 to rotate in a clockwise direction, as indicated by arrow X in Figure 8. At the same time, motion is imparted to the heads 5 by the motor 46 causing the heads and the wheels carried thereby to revolve about the stock S for moving the work holder 51 in a direction opposite to the direction of travel of the adjacent peripheral surface of the wheels or in an anti-clockwise direction as indicated by arrow Y in Figure 2. The pressure bars 63 are then adjusted by the manipulation of the hand-nuts 77 and screws 76 to bring the stock into the required pressure engagement with the abrading wheels 24.

It will be readily understood that the wheels 24 may be of different degrees of coarseness to effect first a rough cut or grinding operation as the wire enters the shaft 3, and then a fine cut to polish the stock as the same is moved outwardly from said shaft. Also, it will be obvious that the degree of pressure of the stock on the abrasive wheels maintained by the work holders may be varied as desired to effect a greater or less degree of grinding or polishing action on the stock. It will also be observed that the surface speed of the abrading wheels 24 may be controlled at will irrespective of the speed of the heads 5 by varying the frequency of the currents applied to the three-phase wheel actuating motors 9, which may be acomplished in any well-known manner as by varying the speed of the generator for supplying the current thereto, as hereinbefore mentioned.

This ability to minutely control the surface speed of the abrasive wheels and the speed at which they are revolved about the work independently of each other, together with the ability to govern the pressure under which the work is engaged by the abrasive wheels by the manipulation of the hand-nut 77, not only permits the grinding and polishing operations to be accomplished in the minimum amount of time, but also enables the maintaining of the finished polished work at a pre-determined size or diameter regardless of any variation in the initial diameter of the stock or the degree of temper thereof or of different grades of materials of the work which may occur without the necessity of stopping or resetting the machine.

It will also be observed that the continuous operation of the machine may be greatly prolonged due to the fact that as the peripheral surfaces of the wheels 24 are worn away by the grinding operation, the work may be readily adjusted toward the wheels by the work holders while the machine is in operation, all of which contributes to the high degree of efficiency of this machine, particularly inasmuch as this lateral adjustment of the stock by means of the work holders may be safely effected to a limited degree without producing whipping or excessive vibration of the stock due to the eccentric relation thereof with the axis of rotation of the heads 5 and the abrasive wheels carried thereby.

In the operation of the machine, it is preferable

that the stock S be maintained at a normal cool temperature during the grinding or polishing operation and, therefore, a case, as indicated by broken lines at 97 in Figure 1, may be mounted upon each shelf 2 over a corresponding abrasive wheel 24 adjacent the outer surface of the head 5 associated therewith.

Water or other cooling liquid may be readily suplied to the cases 97 by any suitable means (not shown) and this liquid, together with the fine loose particles of stock produced by the action of the abrasive wheels, may be carried by conduits, as 98, secured to the shelves 2 in communication with the interior of the respective cases 97 to a suitable vat or drainage (not shown) for separating the liquid from the solids.

In Figures 11, 12, 13, and 14, I have illustrated a modified form of work holder particularly adapted to be used in connection with the head and grinding tool illustrated in the remaining figures of the drawings for automatically maintaining the work in pressure engagement with the abrasive tools during the operation of said tools.

This work holder, as 100, comprises a bracket 101 which is secured to the outer face of each head 5 by screws 102, in the manner hereinbefore described, for the work holder 58. The bracket 101, in this instance, has a lower or inner longitudinal face thereof arranged in substantially parallel relation with the axis of rotation of the head 5, and a holding plate 103 is releasably secured to the lower longitudinal surface of the bracket by means of screws 104 screw threaded in the lower portion of arms or lugs 105 secured to or made integral with the bracket 101 and which extend downwardly beneath the holding plate 103 adjacent either end thereof, as illustrated in Figures 12 and 13. To the other and inner end portions of the bracket 101, is secured a respective angle guide member 106 and 107, as illustrated in Figures 13 and 14.

A slide 108 is mounted on the forward side face of the bracket 100 beneath the guides 106 and 107 for movement toward and from the axis of rotation of the head 5. The slide 108 may, as illustrated in Figure 14, be also provided with guide ways 109 which, in this instance, are substantially V-shaped in cross section and adapted to ride in corresponding V-shaped grooves provided in corresponding guide blocks 110 mounted in the bracket 101 for accurately guiding and maintaining the slide, during the radial movement thereof, in parallel relation with the axis of rotation of the head 5 and shaft 3.

A pressure bar 111 is secured to the lower edge of the slide 110, as illustrated in Figure 12. This bar extends downwardly or inwardly from the inner edge of said slide in close proximity with the adjacent edge of the holding plate 103 for cooperating with said holding plate to maintain the stock in pressure engagement with the periphery of the abrasive wheel 24.

In order that the slide 108 may be automatically moved radially toward the corresponding abrasive wheel 24 during the operation of the machine, and thereby maintain the stock in constant pressure engagement with said wheel as the wheel is decreased in diameter by wear, I have mounted a cam member 114 eccentrically upon a shaft or pin 115 which is secured in the outer ends of a pair of spaced brackets 116 which, in turn, are positioned, in this instance, in an inwardly extending recess 117 provided in the upper edge of the slide 108 and are secured to the adjacent portion of the bracket 101 as by screws 118.

The cam member 114 is preferably mounted upon a ball bearing member 119, as shown in Figure 13, so as to provide for the rotation of said cam with a minimum amount of friction. To the lower or inner wall of the recess 117 is secured a wear plate 120 which is positioned in the plane of the cam 114, to be engaged thereby for pressing the slide inward, substantially radially toward the axis of rotation of the head 5. This cam member 114 is provided with a radially disposed arm 121 which extends outwardly from the periphery thereof and may, as shown in Figure 11 be provided with a weight 122 which is adjustably secured thereto by means of a screw 123 or its equivalent whereby said weight may be moved toward or from the axis of rotation of the cam as required for producing the proper pressure of the stock upon the abrasive wheel.

The arrangement of the cam 114 and arm 121 relative to the direction of rotation of the head 5, is such that the cam will be actuated by the centrifugal force produced on the arm and weight for effecting inward radial movement of the slide 108 and thereby automatically maintain the stock in pressure engagement with the abrasive wheel.

Although I have shown the standard 1 as being provided with a pair of heads 5 and abrasive wheels 24, it is evident that I may utilize but one head and abrasive wheel. Furthermore, it will be understood that other changes in the construction both of the grinding heads and the work holders associated therewith and in the form and the relation of the parts thereof, may readily be made without departing from the spirit of the invention, as set forth in the appended claims.

I claim:

1. In a grinding and polishing machine, a supporting head, means for rotating said head, an abrasive wheel mounted on the head at one side of the axis of movement thereof, a work support connected with the head to rotate therewith and comprising a movable member, and means actuated by the head during the rotation thereof for automatically adjusting the movable member toward the abrasive wheel.

2. In a grinding and polishing machine, a supporting head having an axial passage therethrough for the stock and which is of greater diameter than said stock, means for rotating said head, means for feeding the stock through said opening and adapted to normally maintain the stock in substantially co-axial relation with the head, an abrasive wheel operably mounted on the supporting head, an adjustable work holder, and operating means for the work holder including a member pivotally connected with the work holder to swing about an axis extending substantially parallel with the axis of rotation of the head adapted to be actuated by centrifugal force for automatically moving the stock laterally as the wheel decreases in diameter to maintain the work in pressure engagement with the abrasive wheel against the action of said stock feeding means.

3. In a grinding and polishing machine, the combination with a rotatable supporting head and an abrasive member operably mounted on said head to be revolved thereby about a piece of work in operative engagement therewith, of a work holder comprising a work holding member mounted in fixed relation with the head in close proximity to the operating surface of the abrasive member to maintain the work against lateral dis-

placement incident to the action of said abrasive member, a work pressure member mounted in co-operative relation with the work holding member, and means for adjusting said pressure member relative to the holding member toward the abrasive member to maintain the work in pressure engagement with said abrasive member.

4. In a grinding and polishing machine, the combination with a rotatable supporting head and an abrasive member operably mounted on said head for engaging work, of a work holder comprising a work holding member maintained in fixed relation with the head, a work pressure member, and automatic means for actuating said pressure member relative to the holding member to move the work toward the abrasive member during the operation of said member.

5. In a grinding and polishing machine, the combination with a rotatable supporting head and an abrasive wheel operably mounted on said head for engaging work, of a work holding means mounted on the head to rotate therewith and including a pressure member movable toward and from the abrasive wheel, and means mounted on the head and actuated by said head for automatically adjusting the pressure member relative to the abrasive wheel during rotation of the head.

6. In a grinding and polishing machine, the combination with a rotatable supporting head and an abrasive wheel operably mounted on said head to be revolved thereby about a work piece, of a work holding means mounted on the head to rotate therewith and comprising a support, and a pressure member mounted on the support in co-operative relation with the abrasive wheel, said member having movement relative to the support in a direction parallel with the axis of the work, manually operable means for producing said axial movement of the pressure member including a disk connected to the member and arranged co-axially with the head, and means associated with the support and pressure member co-acting during said axial movement of the member for effecting movement of said member toward and from the wheel.

7. In a wire grinding and polishing machine, the combination with an abrasive member, a rotatable supporting means therefor having an axial passage therethrough for the wire and means for continuously feeding the wire through said passage, of a work holding means mounted on the supporting means to rotate therewith and including a pressure member arranged in opposed spaced relation with the abrasive member for receiving the wire therebetween, and means including an operating unit mounted independently of the supporting means, and co-acting control elements connected with the supporting means and one of said members for producing relative movement of the pressure member and abrasive member toward each other during the rotation of the supporting means and whereby the wire will be maintained in operative relation with the abrasive member with unyielding pressure.

8. In a wire grinding and polishing machine, the combination with an abrasive member, a rotatable supporting means therefor having axial passage therethrough for the wire and means for continuously feeding the wire through said passage, of an adjustable work holding means mounted on the supporting means to rotate therewith and including a pressure member arranged in opposed spaced relation with the abrasive member for receiving the wire therebetween, and means including an operating unit mounted independently of the supporting means and a pair of co-acting control elements connected respectively with the supporting means and with said pressure member for producing movement of the pressure member toward the abrasive member during the rotation of the supporting means and whereby the wire will be maintained in operative relation with the grinding member with unyielding pressure,

9. In a machine for grinding and polishing continuously moving flexible wire stock, the combination with a rotatable supporting mechanism and an abrasive member operably mounted on said mechanism to be revolved thereby about the wire stock, of a work holding means and a work pressure member mounted on the supporting mechanism to rotate therewith in co-operative relation with each other and with the abrasive member, manually operable control means mounted at one side of the supporting mechanism to permit movement thereof independent of said mechanism and operatively connected with the pressure member to produce movement thereof relative to the holding means, and means associated with the pressure member and with the holding means rendered effective by the action of the control means upon the pressure member for adjusting said pressure member toward and from the abrasive member and for fixedly holding said pressure member in the adjusted position.

10. In a machine for grinding and polishing continuously moving flexible wire stock, the combination with a rotatable supporting mechanism and an abrasive member operably mounted on said mechanism to be revolved thereby, about the wire stock, of a work holding means and a work pressure member mounted on the supporting mechanism to rotate therewith in cooperative relation with each other and with the abrasive member, said pressure member having movement relative to the holding means in a direction substantially parallel with the direction of movement of the wire stock, manually operable control means mounted independently of the supporting mechanism and operatively connected with the pressure member to produce said axial movement thereof, and means associated with the holding means and the pressure member co-acted during said axial movement of the latter member for effecting movement of said member toward and from the abrasive member.

11. A device as set forth in claim 10 wherein said latter means includes guide surfaces arranged in slight angular relation with the axis of rotation of the supporting mechanism maintaining the work in operative engagement with the abrasive member with unyielding pressure.

GEORGE D. MOOMAW.