Sept. 8, 1942. A. J. GRAF ET AL 2,295,342

INFEEDING MECHANISM FOR GRINDING MACHINES

Filed Dec. 24, 1940 5 Sheets-Sheet 1

Fig. 1

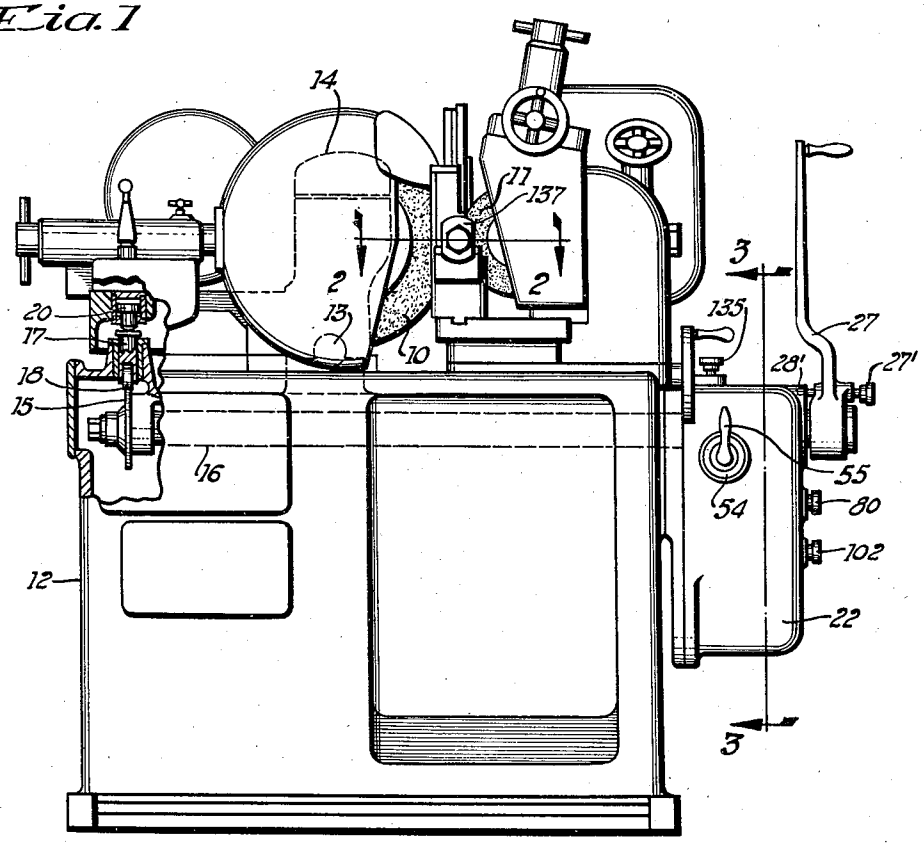
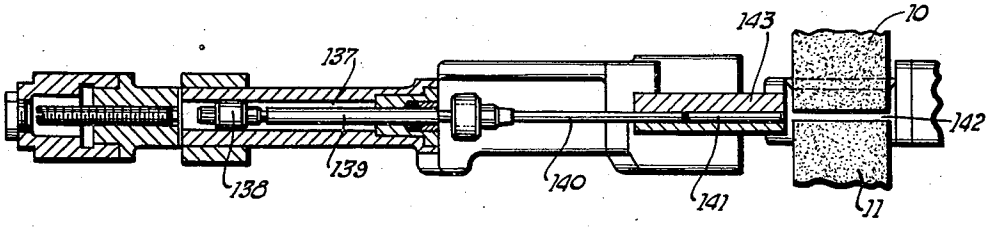



Fig. 2




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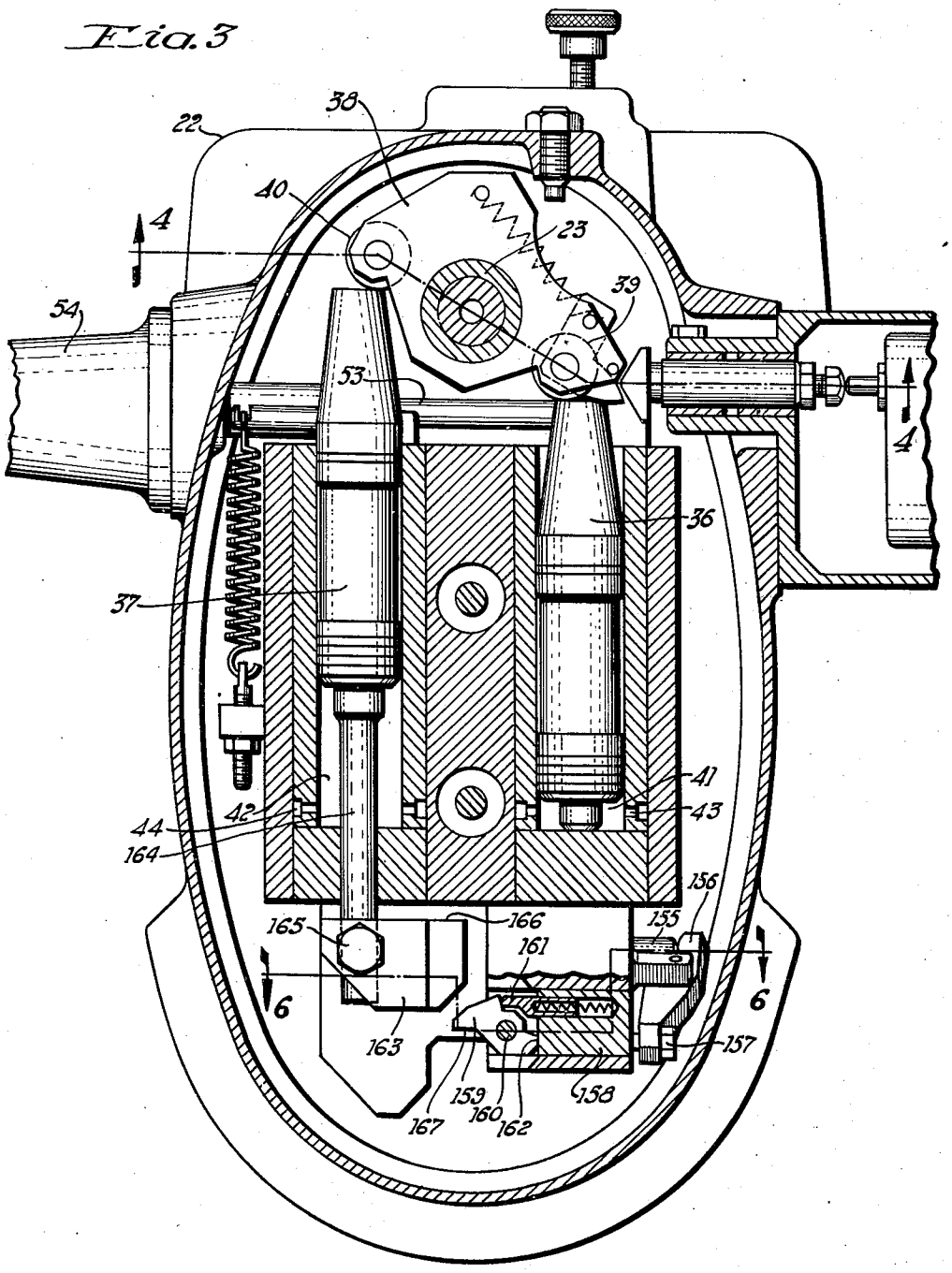
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INFEEDING MECHANISM FOR GRINDING MACHINES

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Fig. 3




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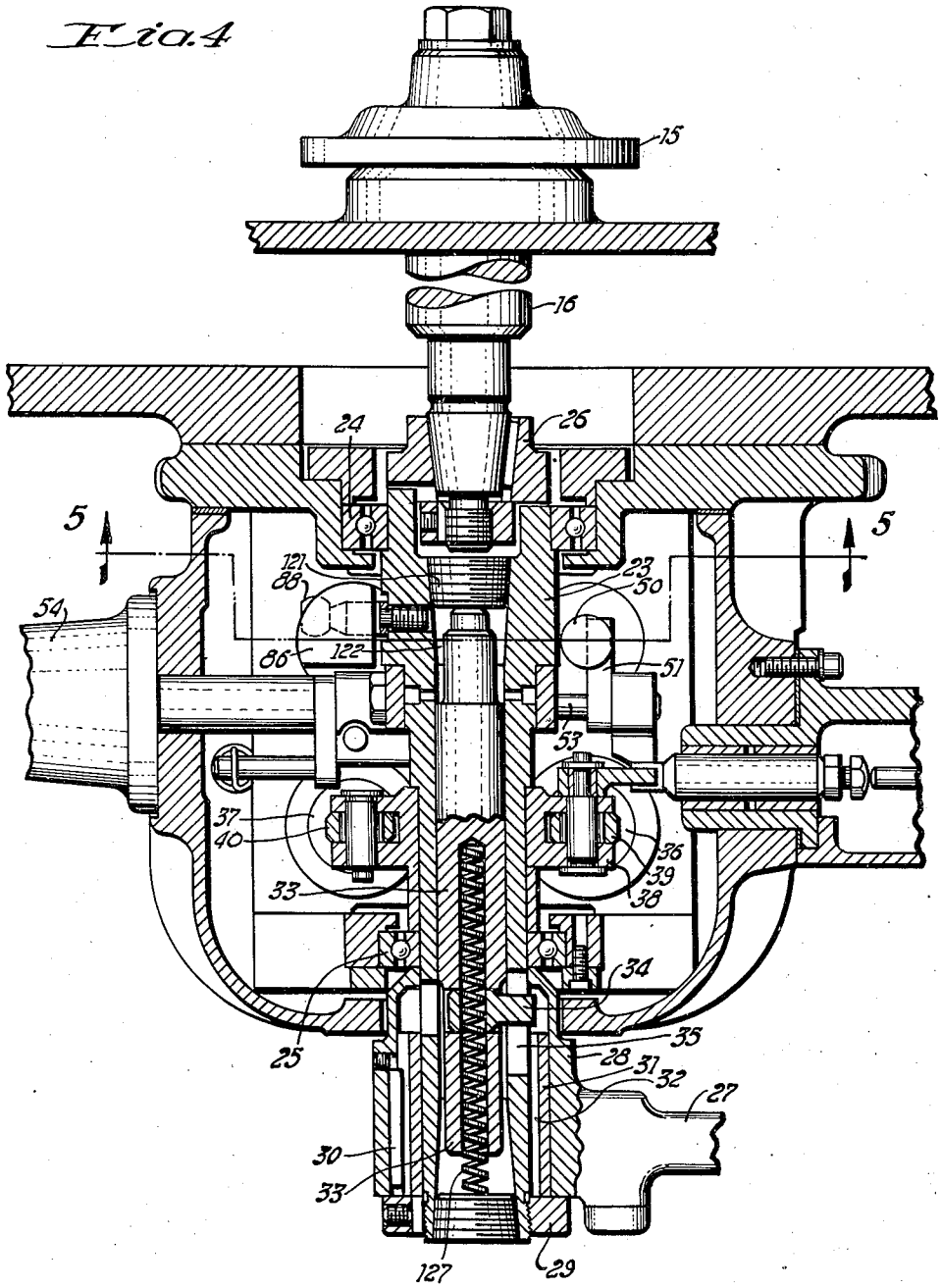
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Sept. 8, 1942. A. J. GRAF ET AL 2,295,342

INFEEDING MECHANISM FOR GRINDING MACHINES

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Fig. 4




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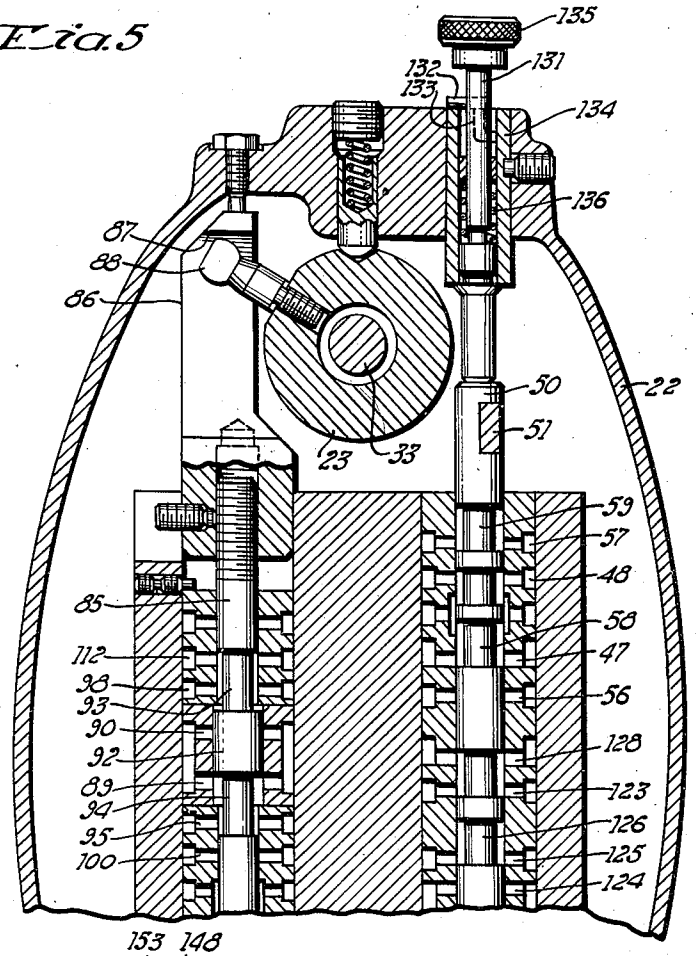
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INFEEDING MECHANISM FOR GRINDING MACHINES

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Fig. 5



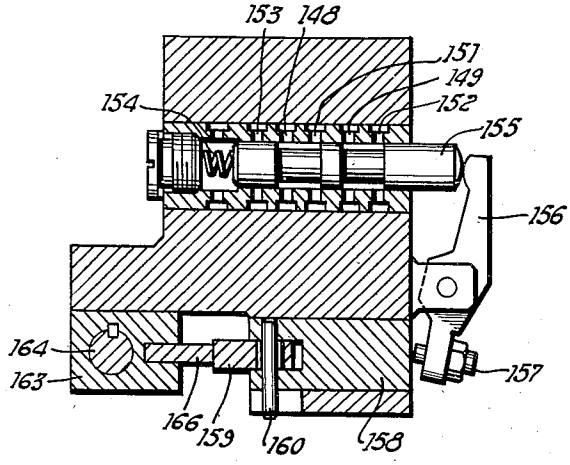




Fig. 6

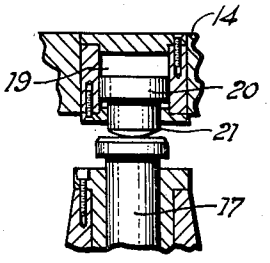



Fig. 7

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INFEEDING MECHANISM FOR GRINDING MACHINES

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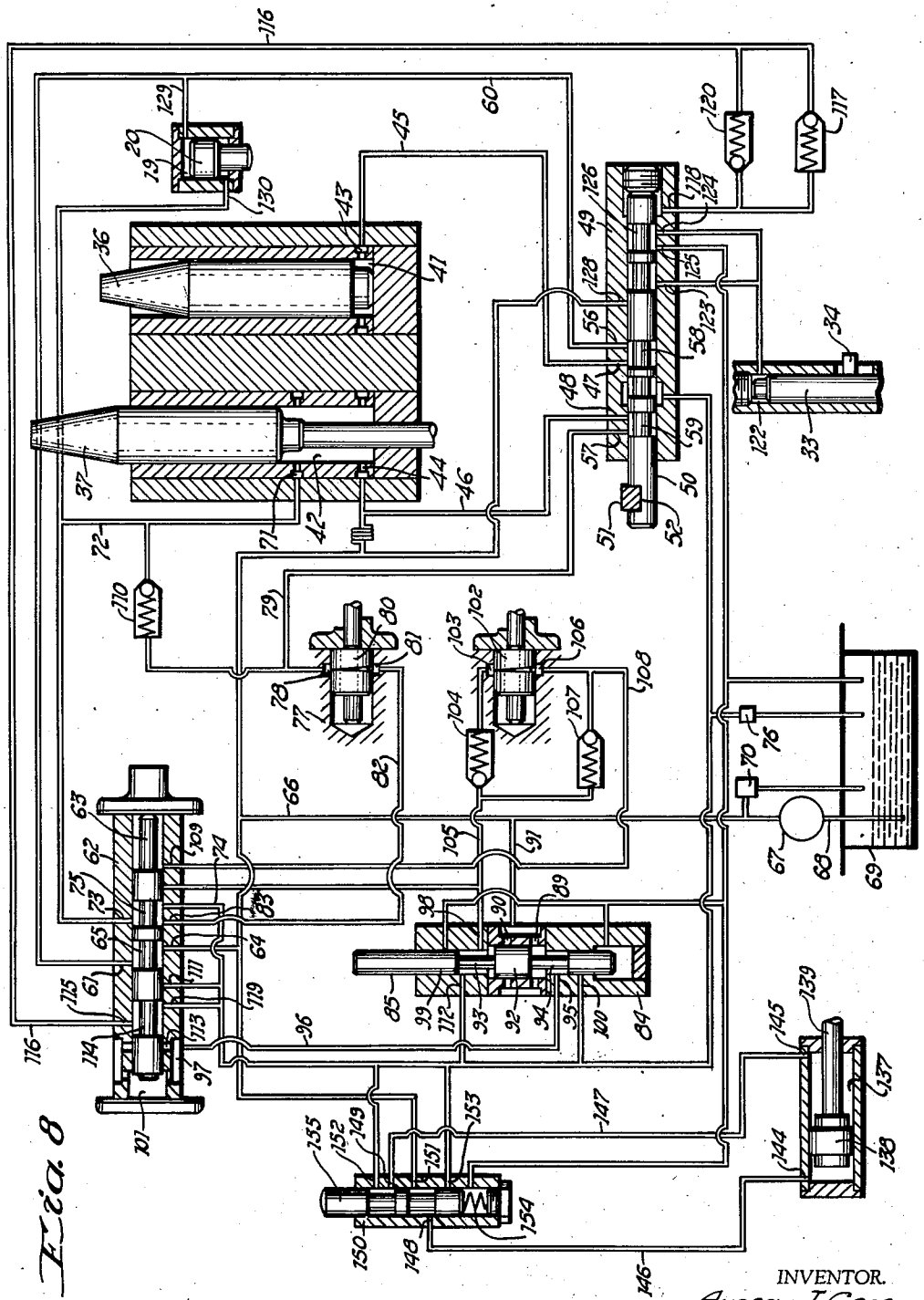


Fig. 8

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Patented Sept. 8, 1942

2,295,342

# UNITED STATES PATENT OFFICE

2,295,342

## INFEEDING MECHANISM FOR GRINDING MACHINES

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Application December 24, 1940, Serial No. 371,505

20 Claims. (Cl. 51—103)

This invention relates to machine tools and more particularly to improvements in grinding machines.

One of the objects of this invention is to provide an improved infeeding mechanism for a grinding machine.

Another object of this invention is to provide improved control means for an infeeding mechanism which may be selectively adjusted to obtain manual operation, automatic single cycle operation or automatic continuous operation.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification, considered in conjunction with the accompanying drawings forming a part thereof and it is to be understood that any modifications may be made in the exact structural details there shown and described, within the scope of the appended claims, without departing from or exceeding the spirit of the invention.

Referring to the drawings in which like reference numerals indicate like or similar parts:

Figure 1 is a side view partly in section of a grinding machine embodying the principles of this invention.

Figure 2 is a detail section on the line 2—2 of Figure 1 showing the work injector.

Figure 3 is a section through the control box on the line 3—3 of Figure 1 showing the fluid operable actuating mechanism.

Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is a section on the line 5—5 of Figure 4.

Figure 6 is a section on the line 6—6 of Figure 3.

Figure 7 is an enlarged detail view of the hydraulic jack.

Figure 8 is a diagrammatic view of the hydraulic control circuit.

The mechanism of this invention is shown for illustrative purposes as applied to a grinding machine of the centerless type. This machine, as shown in Figure 1, includes a grinding wheel 10, a regulating wheel 11 and a work supporting mechanism shown more fully in Figure 2 and all of these parts are supported upon a bed 12.

In the infeed method of grinding the work remains axially stationary and the grinding wheel is moved slowly toward the work while grinding until the work has been reduced to the desired size, after which the grinding wheel is rapidly retracted to permit replacement of the finished work by an unfinished work piece.

In the machine chosen for illustrating this invention the grinding wheel is supported for oscillatory movement toward and from the work on a pivot 13 located between the grinding wheel head 14 and the bed of the machine. The oscillatory movement about the pivot is effected by a cam 15 which is supported on the end of a rotatable shaft 16. The periphery of the cam has a suitably formed contour which will cause a uniform feeding movement of the grinding wheel toward the work. A vertically reciprocable follower 17 is slidably mounted in the bed and has a roller 18 adapted to ride on the periphery of the cam.

The rear of the wheel head 14 is provided with a cylinder 19, Figures 1 and 7, containing a piston 20. The piston has an integral piston rod 21 which extends through one end of the cylinder and into engagement with the follower 17. This piston and cylinder constitutes an hydraulic jack for effecting quick movement of the wheel head independent of the cam.

In other words, if pressure is admitted to the upper end of the cylinder, the wheel head is rotated in a clockwise direction, thereby quickly advancing the grinding wheel to the work after which the cam regulates the feeding movement.

Conversely, if pressure is admitted to the lower end of the cylinder, the wheel head will be immediately retracted so that the grinding wheel will clear the work permitting removal thereof while the cam is being returned to a starting position.

The mechanism of this invention comprises improved means for actuating the cam and controlling the admission of pressure to the cylinder 19 whereby operation of the machine may be controlled manually or may be operated by power, either through a single cycle or through successive cycles in a continuous manner. This mechanism is mounted in a control box 22 which is mounted on one end of the bed as shown in Figure 1, and includes as shown in Figure 4 a sleeve 23 which is supported at opposite ends by antifriction bearings 24 and 25 in the box and operatively connected by a coupling member 26 to the shaft 16. Thus, rotation of the sleeve will effect rotation of the shaft 16 and its associated cam 15.

Means are provided for effecting this rotation either manually or by power. The manual operating means comprises a lever 27 which has an elongated hub 28 by which it is supported for free rotation on the sleeve between the bearing 25 and threaded collar 29. This hub is connected

by a key 30 to a splined bushing 31 having a keyway 32 extending axially thereof.

A shot bolt plunger 33 is slidably mounted within the sleeve 23 and carries a radial extending key 34 which projects through an elongated slot 35 in the sleeve for insertion into the keyway 32.

Since the sleeve is rotatable independently of the lever 27, positioning means are provided for obtaining alignment between the key and keyway comprising a spring pressed plunger 27' carried by the lever which is insertable in a hole 28' formed in the box 22 as shown in Figure 1. This defines the position of the lever. Means are provided to be described later for defining the starting position of the sleeve which is such that the key will be in alignment with the keyway whereby the key may be automatically inserted in the keyway by the plunger 33. Thus the manual control is always connected to the sleeve except during power operation when it is automatically disconnected, and at the end of power operation, it is automatically reconnected.

Power rotation of the sleeve 23 is effected by a pair of fluid operable pistons 36 and 37 which are shown in Figures 3 and 4. A walking beam 38 is attached to the sleeve 23 and supports rollers 39 and 40 which engage the ends of the respective pistons 36 and 37. Actuation of the piston 36 rotates the walking beam in a counterclockwise direction to effect infeed of the grinding wheel, while actuation of the piston 37 rotates the walking beam in a clockwise direction to effect return of the grinding wheel. A hydraulic circuit shown in Figure 8 controls admission of fluid pressure to the cylinders 41 and 42 which contain the pistons 36 and 37. These cylinders have end ports 43 and 44 which are connected by channels 45 and 46 to ports 47 and 48 of a start and stop valve 49.

This valve has a plunger 50 which is operatively connected by a lever 51, fitting slot 52 in the side of the plunger to a shaft 53. This shaft extends through a boss 54 mounted on the side of the box 22 for attachment of a manually operable handle 55 as shown in Figure 1 of the drawings. This handle constitutes a start and stop lever for the power cycle and by rotating the lever counterclockwise, as viewed in Figure 1, the plunger 50 will be moved downward to the start position in which it is shown in Figure 8. Thus, ports 47 and 48 are connected to ports 56 and 57 by the plunger grooves 58 and 59. The port 56 is connected by a channel 60 to port 61 of a combination rate and direction valve 62. This valve has a shiftable plunger 63, which in the position shown effects a feeding movement of the grinding wheel toward the work by causing upward movement of the piston 36 as viewed in Figures 3 and 7. This is accomplished by connecting port 61 to the pressure port 64 by means of the annular groove 65 in the plunger 63. The port 64 is supplied with fluid pressure through channel 66 by the pump 67 which has an intake 68 for drawing fluid from a reservoir 69. The channel 66 may be provided with a branch connection to a relief valve 70 which controls the limit of pressure in the system.

As the piston 36 moves upward and rotates the walking beam 38 in a counterclockwise direction it causes downward movement of the piston 37, forcing the fluid ahead of the piston to exhaust, first through the port 71, and then through the port 44.

The port 71 is connected directly by a channel 72 to port 73 of the reversing valve which, in turn, is connected to a return line 74 by the annular groove 75 in the plunger. The return line 74 has a low pressure relief valve 76 through which the fluid is returned to the reservoir 69 and this relief valve is merely provided for maintaining the system full of fluid.

It will thus be seen that rotation of the cam shaft will occur at a rapid rate until the port 71 is closed, after which the fluid must be forced through a throttle valve 77, the port 78 of which is connected by channel 79 to port 57 of the start and stop valve. The throttle valve has a rotatable plunger 80 whereby the valve may be rotatably adjusted to control the rate of flow therethrough and thereby control the rate of infeed of the grinding wheel. The exhaust port 81 of the throttle valve is connected by channel 82 to port 83 of the reversing valve which is connected to the exhaust line 74 by the plunger groove 75.

The plunger 63 of the reversing valve 62 is shifted by hydraulic presssure to change the rate and direction of the wheel head and the shifting is automatically controlled by a pilot valve 84. This pilot valve has a plunger 85 to which is threadedly attached an enlarged head 86 as shown in Figure 5. In this head is an elongated slot 87 which provides a lost motion connection with a trip lever 88 projecting radially from the sleeve 23. As the sleeve is rotated in a counterclockwise direction by the piston 36 the trip lever 88 engages the lower end of the slot 87 and shifts the plunger 85 downward.

The valve 84 is provided with a pair of spaced pressure ports 89 and 90 which are connected by a branch line 91 to the pump supply line 66. The plunger has an enlarged central spool 92 which is flanked by annular grooves 93 and 94. With the plunger in the position shown the pressure port 89 is connected by the annular groove to port 95 whereby the fluid pressure flows through channel 96 to port 97 located in the left end of the reversing valve 62, thus positioning the plunger 63 as shown. When the plunger 85 is moved downward by the trip lever, the port 89 closes and the port 90 opens whereby the fluid flows through the annular groove 93 to port 98. Since the central spool 92 is larger in diameter than the end spool 99 a pressure differential is created which acts to fire the valve like a load and fire mechanism. The annular groove 94 will now connect the port 95 to an exhaust port 100 which is connected to the return line 74.

The fluid in the space 101 located in the left end of the reversing valve housing 62 may now be returned to reservoir as fast as the plunger 63 moves to the left. This movement is delayed, however, by a tarry control mechanism which functions to momentarily retard the return of the grinding wheel so as to give the grinding wheel a chance to finish the work to the desired size. The tarry mechanism comprises a tarry valve 102 which has a port 103 connected through a check valve 104 and channel 105 to port 98 of the pilot valve. A second port 106 in the tarry valve is connected by a second check valve 107 to line 105. It will be noted that this check valve is connected oppositely to check valve 104 whereby when the pressure fluid enters channel 105 the check valve 104 will open while the check valve 107 will close.

This causes the fluid to be forced through the tarry valve 102 into a channel 108 which leads to port 109 located in the right hand end of the reversing valve 62. As the fluid pressure slowly

enters this port the plunger 63 will move slowly toward the left, closing and then opening the pressure port 64 whereby the annular groove 75 will connect port 64 to the port 73 to effect delivery of fluid pressure to the piston 37. It should be remembered that at this time the piston 37 is at the lower end of the cylinder whereby the port 71 is closed so that the fluid pressure entering channel 72 must open check valve 110 in its flow through channel 79 and interconnected ports 57 and 48 of the stop and start valve, to port 44.

It will be noted that the fluid pressure can flow to the end of piston 37 in practically an unrestricted manner whereby the piston 37 will rotate the cam shaft at a fast rate. The fluid in cylinder 41 will be returned through channel 45, interconnected ports 47 and 56 of the start and stop valve and channel 60 to the reversing valve and since the port 61 is connected to the exhaust port 111 by the annular groove 65 there is no restriction to the exhaust of fluid from the cylinder 41.

As soon as the port 71 is uncovered the fluid pressure in channel 72 may flow directly to the cylinder 42, thereby by-passing the check valve 110. As the cam shaft reaches the end of its return movement the trip lever 88 will again shift the pilot valve 85, this time in an upward direction, interconnecting the port 89 with port 95 and the port 98 with an exhaust port 112.

Fluid pressure will now enter the left end of the reversing valve 62, shifting the plunger toward the right and the fluid in the right hand end of the reversing valve will be exhausted to reservoir through the check valve 107, thereby by-passing the tarry valve 102. This will position the reversing valve for the initiation of another cycle.

Attention is invited to the fact, however, that a second port 113 is located in the left end of the reversing valve and this port is connected by an annular groove 114 to a port 115. The latter port is connected by means of the channel 116 and a check valve 117 to port 118 located in the right hand end of the start and stop valve 49 whereby when the pressure is connected to channel 96 to cause shifting of the reversing valve plunger to the right, a shot of oil will be delivered to the end of the start and stop valve plunger 50, forcing the same to a stop position at the same time that the reversing valve plunger is shifted. Thus, although the reversing valve plunger is in a position to start a new cycle, the start and stop valve plunger has been shifted to stop initiation of that cycle.

As the reversing valve plunger completes its shifting movement to the feed position it disconnects the port 115 from the pressure port 113 and subsequently connects the port 115 to an exhaust port 119 whereby the line 116 through which the shot of fluid pressure was delivered to shift the stop valve plunger to a stop position is now connected to reservoir. This makes it possible for the operator to move the stop valve plunger manually to a running position by forcing the fluid which shifted the plunger to reservoir through a check valve 120 connected in parallel with the check valve 117 but arranged to work opposite thereto.

Means are provided whereby the manual control lever is automatically connected to the sleeve 23 after each automatic cycle. One end of the sleeve is closed by a plug 121 as shown in Figure 4 to form a cylinder 122 in which the plunger 33 moves as a piston. This cylinder, as shown in Figure 8, is connected to ports 123 and 124 of the stop valve 49. When the stop valve is in a running position as shown in Figure 8 the port 124 is connected to an exhaust port 125 by the annular groove 126 formed in plunger 50. This permits the spring 127 shown in Figure 4 to shift the plunger 33 in a direction to disengage the key 34 from the keyway 32. When the stop valve plunger 50 is shifted to a stop position, the port 124 is closed and the port 123 is connected to the pressure port 128 whereby fluid pressure is admitted to the cylinder 122, shifting the plunger 33 in a direction to operatively connect the manual control to the sleeve 23. Thus, the position of the stop valve automatically determines whether the manual control lever is operatively connected for manual actuation of the infeed mechanism or not.

The hydraulic jack comprising the cylinder 19 and the piston 20 for imparting a quick movement to the grinding wheel is automatically controlled by connecting opposite ends of the cylinder 19 by channels 129 and 130 to ports 61 and 73 of the reversing valve whereby the port 61 is connected to pressure to effect advance of the wheel, the jack will be operated to raise the rear end of the wheel head and when pressure is connected to the port 73 to effect retraction of the grinding wheel the jack will be operated to lower the rear end of the wheel housing.

It is also possible to obtain automatic repetition of the cycle in a continuous manner and this is accomplished by providing means for locking the stop valve in a running position whereby the shot of fluid pressure which is delivered to the stop valve housing at the end of each cycle is ineffective to shift the stop valve plunger. This is accomplished by providing a lock-out plunger 131 as shown in Figure 5. This plunger carries a pin 132 which is adapted to engage a bayonet slot 133 formed in a bushing 134. By rotating the plunger by means of the knurled knob 135 the pin may be aligned with the axial length of the bayonet slot at which time a spring 136 is enabled to shift the plunger 131 in a direction to move the stop valve plunger 50 to a running position. The knob is then rotated whereby the pin moves in the circumferential portion of the slot, thereby locking the stop valve plunger against return axial movement. When it is desired to stop the continuous cycle the knob is reversely actuated, lifted and then rotated again until the pin is out of alignment with the slot.

With the machine operating continuously, it is, of course, necessary that the work be fed to the machine with regularity, and in order to relieve the operator of constant attention to this duty means are provided for automatically inserting a work piece after each cycle. The work injector is shown in Figure 2 and comprises a cylinder 137 and a piston 138, the piston having a piston rod 139 which is connected to a work injecting pin 140. This pin engages the end of a work piece such as 141 and when the piston 138 is advanced the work piece is inserted between the grinding wheels 10 and 11 where it is supported on a work rest blade 142. The block 143 in which the work piece 141 is supported for insertion into the machine may constitute the end of a hopper feed mechanism, the details of which are not shown because they do not form part of this invention and such hoppers are well known in the art.

As the pin 140 is withdrawn, another work piece drops into position in front of the pin ready

for insertion whereby insertion of the new work piece will eject the finished work piece in front of it. The cylinder 137, as shown in Figure 8, has its end ports 144 and 145 connected by channels 146 and 147 to ports 148 and 149 respectively of a reversing valve 150. This valve has a pressure port 151 and a pair of exhaust ports 152 and 153. The valve has a spring 154 mounted in one end which continuously acts on the plunger 155 to shift it in a direction to effect clockwise rotation of the centrally pivoted lever 156 as shown in Figure 6 of the drawings. The end of this lever has an adjustable set screw 157 which bears against the end of slide 158. This slide, as shown in Figure 3, carries a latch pawl 159 which is rotatably supported on a pin 160 carried by the slide 158. A spring pressed plunger 161 continuously urges the pawl in one direction, while the heel 162 of the pawl engages the end of the slide to limit the amount of its rotation. The piston 37 carries a dog 163 fastened to the end of piston rod 164 by a set screw 165.

As the piston 37 completes its downward movement which corresponds to the limit of the infeeding movement of the grinding wheel it engages the end of the pawl 159 and shifts the slide 158 to the right as viewed in Figure 3 and thereby depresses the plunger 155 which causes connection of pressure port 151 to port 149 whereby the piston 138 is retracted to pick up a new work piece. The downward movement of the dog 163 is sufficient for the upper face 166 of the dog to pass the face 167 on the pawl 159 whereby during upward movement of the piston rod the pawl is rotated in a counter-clockwise direction without causing movement of the plunger until the piston 37 has practically completed its movement. At this time the dog clears the pawl and plunger 161 returns the pawl, and spring 154 returns the plunger 155 as well as the slide 158, thereby connecting pressure port 151 to port 148 so that pressure is admitted to cylinder 137 resulting in the piston 138 ejecting the finished work piece and inserting an unfinished work piece. Attention is invited to the fact that this work injector is unaffected by the type of cycle being used and therefor may be utilized with a single automatic cycle as well as with the continuous cycle.

It should now be apparent that there has been provided an improved infeeding mechanism for a grinding machine which may be selectively operated, either manually or automatically and which under automatic operation may be selectively actuated under a single cycle method or a repeating cycle method.

What is claimed is:

1. In a grinding machine having a grinding wheel support and a work support, the combination of an oscillatable member operatively connected for alternately infeeding and returning the grinding wheel support, means for effecting said oscillation including a walking beam attached to said member, pistons located adjacent the ends of said beam and shiftable into operative engagement therewith and means for alternately delivering fluid pressure to said pistons to shift same into engagement with said beam and effect oscillation of said member.

2. In a grinding machine having a grinding wheel support and a work support, the combination of an oscillatable member operatively connected for infeeding and returning the grinding wheel support, means for effecting oscillation of said member including a manually actuable device, a first piston for effecting the infeeding movement, a second piston for effecting the return movement, a source of pressure and control means for alternatively connecting said source of pressure to said manually actuable device and to said pistons whereby said member may be manually actuated or automatically by operation of the pistons to effect a cycle of operation of said grinding wheel support.

3. In a grinding machine having a grinding wheel support and a work support, the combination of an oscillatable member operatively connected to the grinding wheel support, a pair of fluid operable devices for alternately moving said member, means to sequentially effect admission of pressure to said devices to advance and retract the grinding wheel support, and means to simultaneously disconnect both of said devices from pressure to disassociate said devices from the member, and additional means to actuate said member to effect relative movement between the supports.

4. In a grinding machine having a grinding wheel support and a work support, the combination of an oscillatable member operatively connected for effecting relative advance and retraction of one of said supports relative to the other, a manual control lever, pressure operable means for connecting said control lever for actuation of said member, fluid operable means for power actuating said member, and means for disconnecting fluid pressure from said pressure operable means during power actuation of said support.

5. In a grinding machine having a grinding wheel support and a work support, the combination of fluid operable means for effecting power operation of one of said supports, manually operable means for effecting oscillation of said support, a common member for transmitting motion from either of said devices to the support, and means for automatically disconnecting said manually operable means from said common member during power actuation thereof.

6. In a grinding machine having a grinding wheel support and a work support, the combination of an oscillatable member operatively connected for advancing and retracting one of said supports relative to the other to effect a grinding operation, fluid operable means for oscillating said member, a source of fluid pressure, control means for sequentially connecting said source of pressure to said fluid operable means, a manually control lever for said member, a fluid operable device for connecting said manual control lever to said member, and means operable by said control means for connecting said source of pressure to said fluid operable device when fluid pressure is disconnected from said fluid operable means.

7. In a grinding machine having a grinding wheel support and a work support, the combination of an oscillatable member operatively connected for effecting relative movement between said supports in opposite directions, fluid operable devices for actuating said member in opposite directions, and control means for said fluid operable means including a reversing valve for selectively determining the connection of pressure to the respective fluid operable means, a stop valve interposed for blocking the flow of fluid pressure to both of said fluid operable means, and means in the reversing valve effective during one direction of shifting thereof to effect fluid shifting of the stop valve to a stop position.

8. In a grinding machine having a grinding wheel support and a work support, the combination of an oscillatable member operatively connected for effecting relative movement between said supports in opposite directions, fluid operable devices for actuating said member in opposite directions, and control means for said fluid operable means including a reversing valve for selectively determining the connection of pressure to the respective fluid operable means, a stop valve interposed for blocking the flow of fluid pressure to both of said fluid operable means, means in the reversing valve effective during one direction of shifting thereof to effect fluid shifting of the stop valve to a stop position, and means adapted to be interposed to prevent shifting of said stop valve whereby the cycle of operation will be continuously repeated.

9. In a grinding machine having a bed, a grinding wheel and a regulating wheel mounted on said bed and a work rest interposed between said wheels, the combination of an oscillatable member operatively connected for advancing and retracting one of said wheels relative to the work support, a first fluid operable piston for advancing said grinding wheel, a second fluid operable piston for returning said grinding wheel, a fluid operable device for injecting a work piece on said work rest, and means trip operable by the last-named piston during actuation thereof to effect fluid operation of said fluid operable device whereby during return movement of the grinding wheel the finished work piece will be ejected from the machine and an unfinished work piece substituted therefor.

10. In a grinding machine having a grinding wheel support and a work support, the combination with an oscillatable member operatively connected for infeeding and returning the grinding wheel support, of means for effecting oscillation of said member including a manually actuable device, a first piston element for oscillating the member to effect an infeed movement, a second piston element for oscillating the member to effect a return movement, a source of pressure, control means for alternatively connecting said source of pressure to said manually actuable device to couple same with the member or to said pistons to effect a cycle of operation of said grinding wheel support, and means for locking said device against movement whereby oscillation of the member is prevented.

11. In a grinding machine having a grinding wheel support and a work support, the combination of an oscillatable member operatively connected for advancing and retracting one of said supports with respect to the other, means for effecting oscillation of said member including a cylinder, a piston within the cylinder, means for effecting movement of the piston in one direction, and means for controlling the movement of the piston including conduits coupled with the cylinder respectively at terminal and intermediate portions thereof, means providing a pressure or direct reservoir connection for the intermediately coupled conduit, means providing a reservoir connection including a throttle for the other of said conduits, and means for interconnecting the respective conduits to bypass the throttle upon connection of pressure to the first-mentioned conduit.

12. In a machine of the character described, the combination with a movable support, of means for controlling opposite directional movements of the support including a pair of oppositely movable piston elements, a hydraulic actuating circuit for said piston elements including a source of hydraulic pressure medium, a reversing valve for effecting alternate couplings of pressure to the piston elements, a hydraulically actuable stop valve shiftable alternatively into positions to couple the pressure with or disconnect same from the piston elements, and means in the reversing valve for effecting a temporary coupling of actuating pressure with the stop valve for shifting the same into stop position during the reversing stroke of the reversing valve whereby a single cycle of piston movements is effected.

13. In a machine of the character described, the combination with a movable support, of means for controlling opposite directional movements of the support including a pair of oppositely movable piston elements, a hydraulic actuating circuit for said piston elements including a source of hydraulic pressure medium, a reversing valve for effecting alternate couplings of pressure to the piston elements, a hydraulic actuable stop valve shiftable alternatively into positions to couple the pressure with or disconnect same from the piston elements, means in the reversing valve for effecting a temporary coupling of actuating pressure with the stop valve for shifting the same into stop position during the reversing stroke of the reversing valve whereby a single cycle of piston movements is effected, and means for locking the stop valve against actuation by the hydraulic medium whereby continuous reciprocations of the pistons are effected as determined by the positionings of the reversing valve.

14. In a machine of the character described, the combination with a movable support, of means for controlling opposite directional movements of the support including a pair of oppositely movable piston elements, a hydraulic actuating circuit for said piston elements including a source of hydraulic pressure medium, a reversing valve for effecting alternate couplings of pressure to the piston elements, a hydraulic actuable stop valve shiftable alternatively into positions to couple the pressure with or disconnect same from the piston elements, means in the reversing valve for effecting a temporary coupling of actuating pressure with the stop valve for shifting the same into stop position during the reversing stroke of the reversing valve whereby a single cycle of piston movements is effected, a manual actuator for the movable support, and means activated by movement of the stop valve into stop position to couple the manual actuator for support movement.

15. In a machine of the character described, the combination with a movable support, of means for controlling opposite directional movements of the support including a pair of oppositely movable piston elements, a hydraulic actuating circuit for said piston elements including a source of hydraulic pressure medium, a reversing valve for effecting alternate couplings of pressure to the piston elements, a hydraulically actuable stop valve shiftable alternatively into positions to couple the pressure with or disconnect same from the piston elements, means in the reversing valve for effecting a temporary coupling of actuating pressure with the stop valve for shifting the same into stop position during the reversing stroke of the reversing valve whereby a single cycle of piston movements is effected, a manual actuator for the movable support, means activated by movement of the stop valve into stop position to couple the manual actuator

for support movement, and additional manual actuable means for shifting the stop valve into circuit completing position for power actuation of the pistons.

16. In a machine of the character described, the combination with a movable support, of means for controlling opposite directional movements of the support including an oscillatable actuating member, a manual actuator operatively couplable therewith, a pair of piston elements projectable into operative engagement with the member, a hydraulic actuating circuit, and a selector valve shiftable alternatively to couple the hydraulic actuating circuit with the manual actuator or with the pistons, whereby said devices are rendered alternatively effective for movement of the oscillatable member.

17. In a machine of the character described, the combination with a movable support, of means for controlling opposite directional movements of the support including an oscillatable actuating member, a manual actuator operatively couplable therewith, a pair of piston elements projectable into operative engagement with the member, a hydraulic actuating circuit, a selector valve shiftable alternatively to couple the hydraulic actuating circuit with the manual actuator or with the pistons, whereby said devices are rendered alternatively effective for movement of the oscillatable member, a controller for determining the directional effectiveness of the hydraulic circuit as respects the pistons, and operative connections between the controller and the selector valve for shifting the selector valve to disconnect the hydraulic actuating circuit from the pistons.

18. In a machine of the character described, the combination with a movable support, of means for controlling opposite directional movements of the support including an oscillatable actuating member, a manual actuator operatively couplable therewith, a pair of piston elements projectable into operative engagement with the member, a hydraulic actuating circuit, a selector valve shiftable alternatively to couple the hydraulic actuating circuit with the manual actuator or with the pistons, whereby said devices are rendered alternatively effective for movement of the oscillatable member, a controller for determining the directional effectiveness of the hydraulic circuit as respects the pistons, operative connections between the controller and the selector valve for shifting the selector valve to disconnect the hydraulic actuating circuit from the pistons, and means for locking the selector valve against such disconnecting movement.

19. In a machine of the character described, the combination with a movable support, of means for controlling opposite directional movements of the support including reversely shiftable piston means operatively associatable with the support, a source of hydraulic actuating medium for the piston and control means for said medium including a hydraulically actuable reversing valve intervening the source and the pistons, a selector valve for determining the effective reaction of the hydraulic medium as respects the piston means, a pilot valve actuable by movement of the piston means for hydraulically determining the positioning of the reversing valve, the reversing valve having a pilot portion, and conduit means hydraulically coupling the reversing and selector valves whereby shifting of the reversing valve will activate the selector valve as determined by the pilot portion of the reversing valve.

20. In a machine of the character described, the combination with a movable support, of means for controlling opposite directional movements of the support including reversely shiftable piston means operatively associatable with the support, a source of hydraulic actuating medium for the piston and control means for said medium including a hydraulically actuable reversing valve intervening the source and the pistons, a selector valve for determining the effective reaction of the hydraulic medium as respects the piston means, a pilot valve actuable by movement of the piston means for hydraulically determining the positioning of the reversing valve, the reversing valve having a pilot portion, conduit means hydraulically coupling the reversing and selector valves whereby shifting of the reversing valve will activate the selector valve as determined by the pilot portion of the reversing valve, a manual actuator for the movable support, a control piston for determining the coupling of said actuator to the support, and means in the selector valve for coupling the hydraulic actuating medium to said piston upon activation of the selector valve through movement of the reversing valve.

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