Aug. 3, 1965 G. HAUMANN 3,198,226

HYDRAULIC VENEER LATHE

Filed June 5, 1961 5 Sheets-Sheet 1

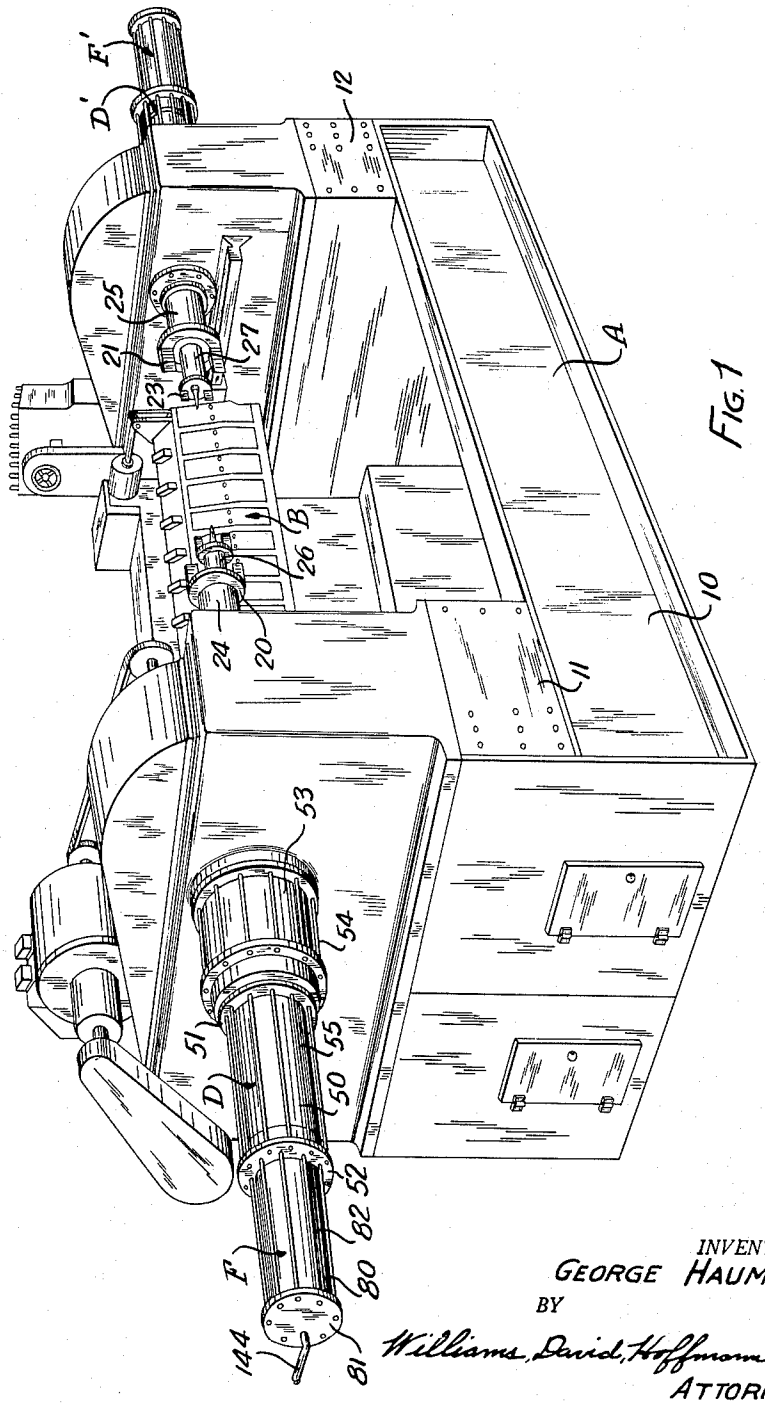

FIG. 1

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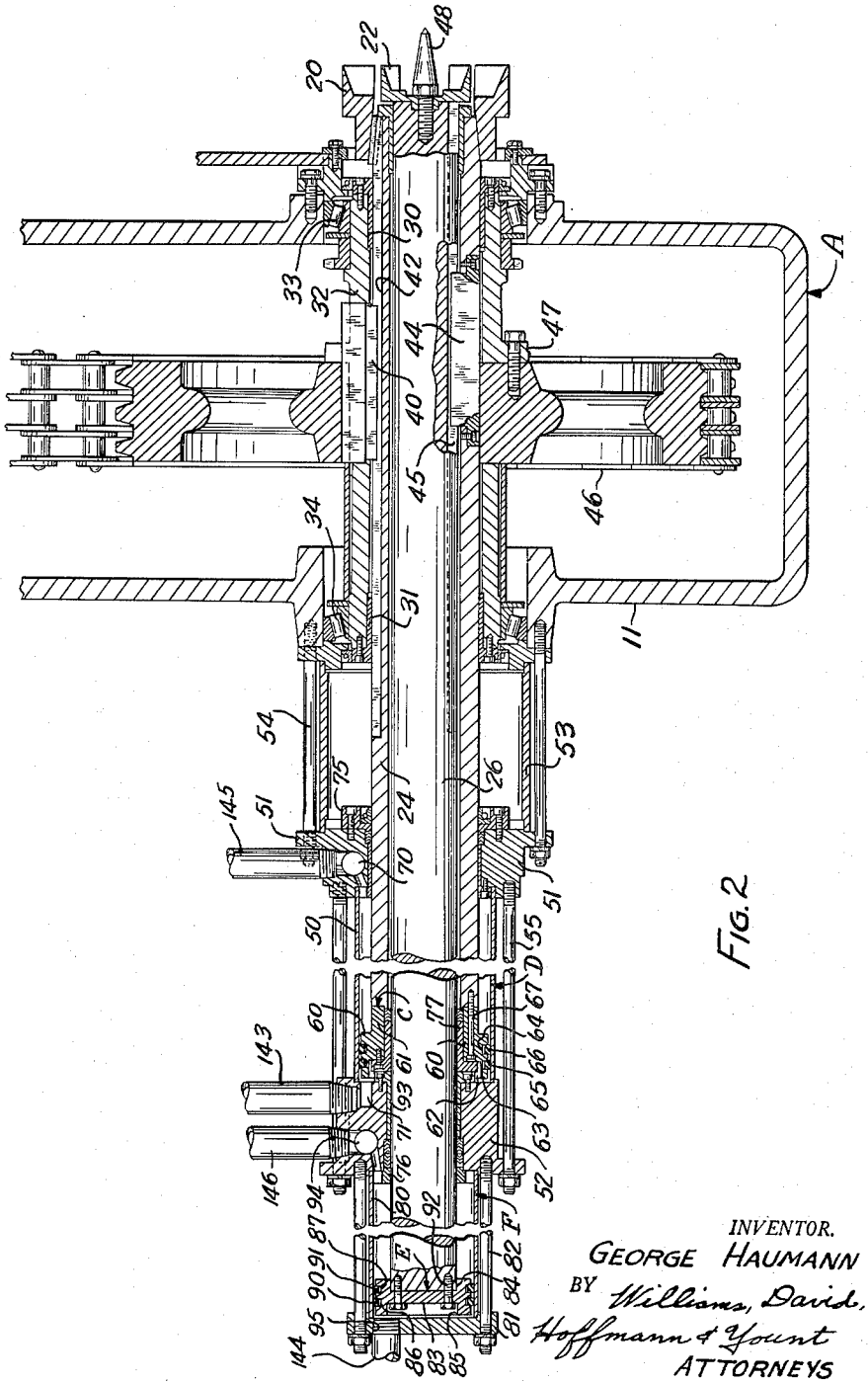

FIG. 2

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Filed June 5, 1961 5 Sheets-Sheet 3

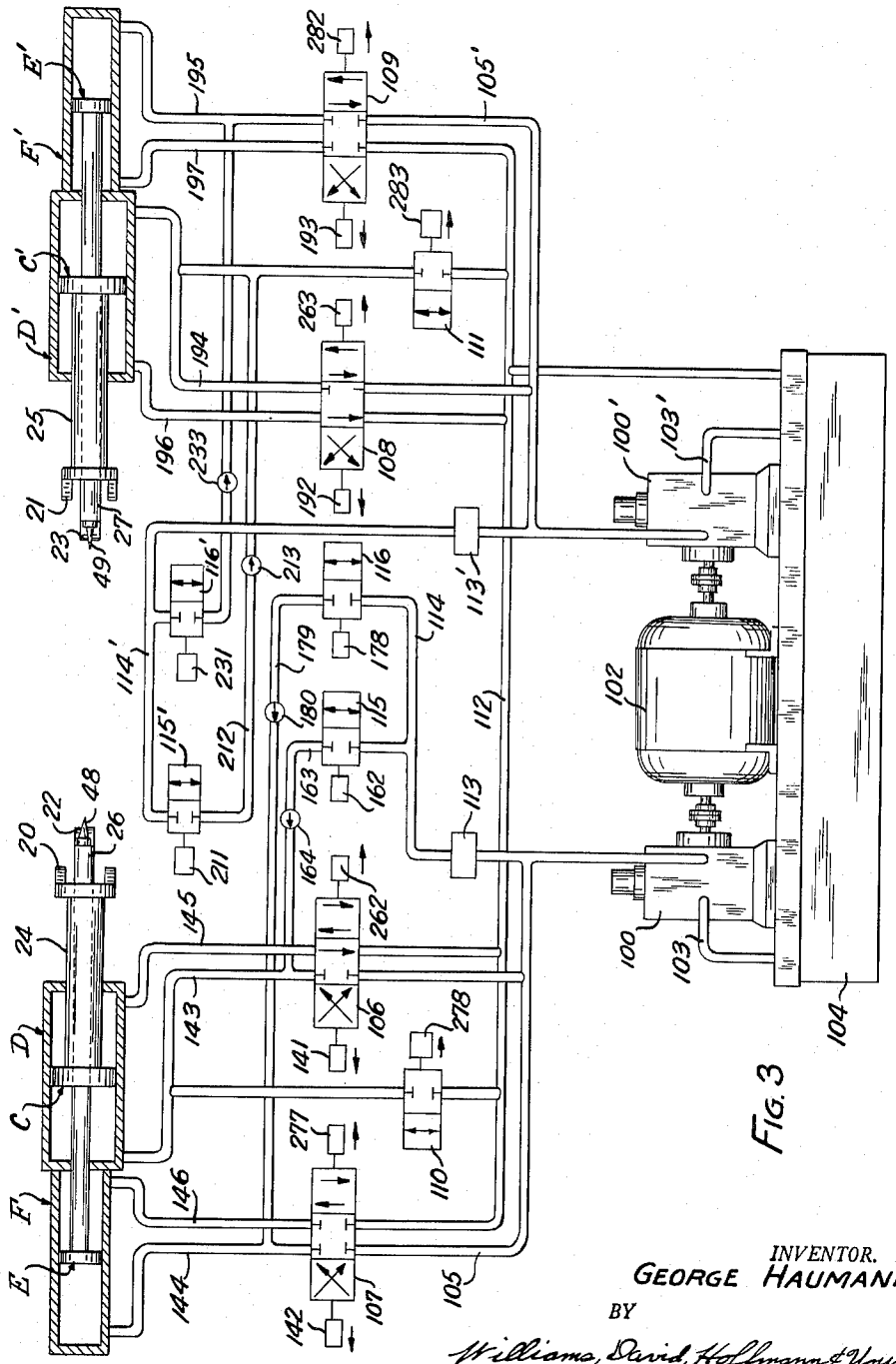

FIG. 3

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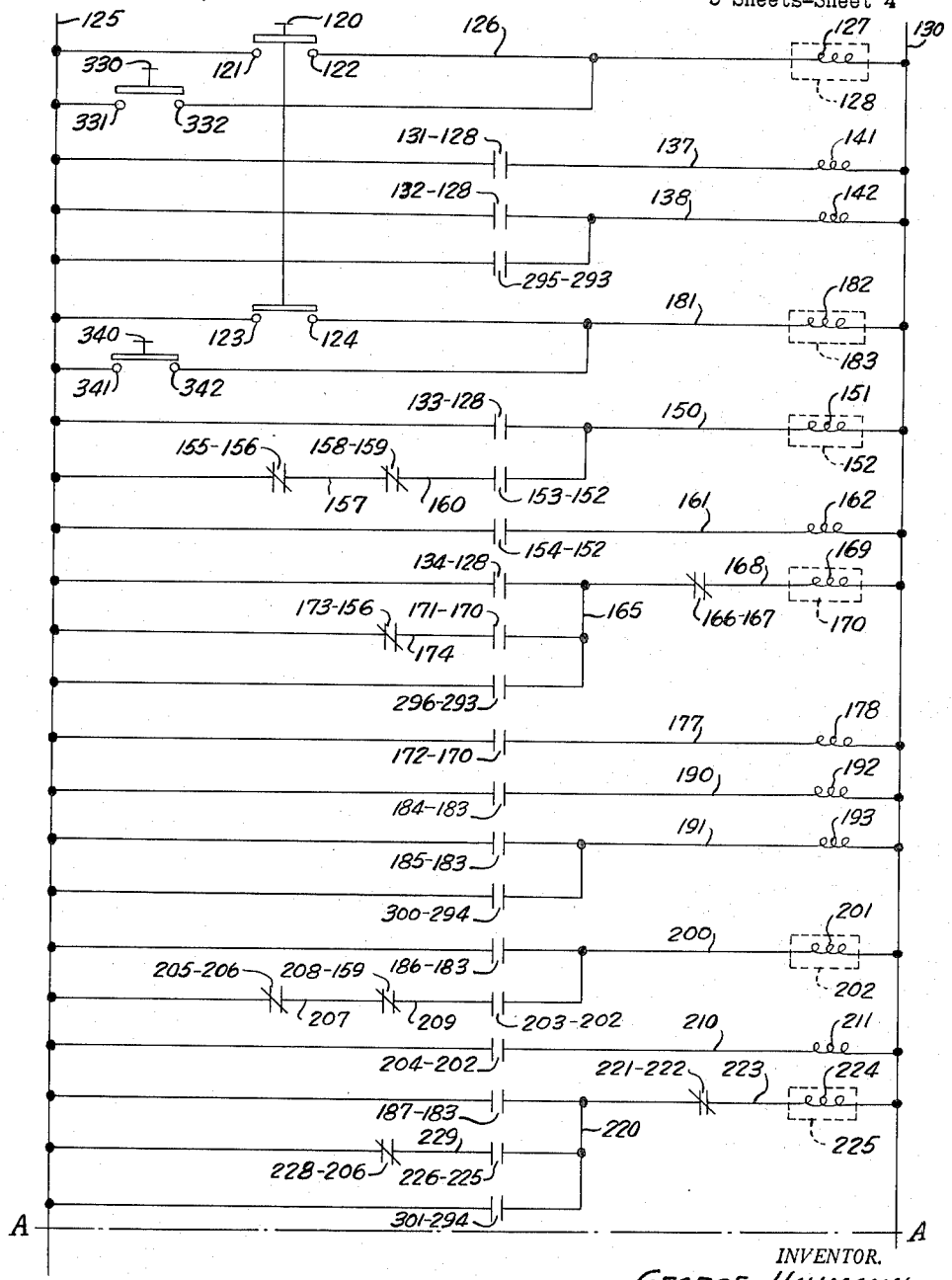

FIG. 4a

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Filed June 5, 1961 5 Sheets-Sheet 5

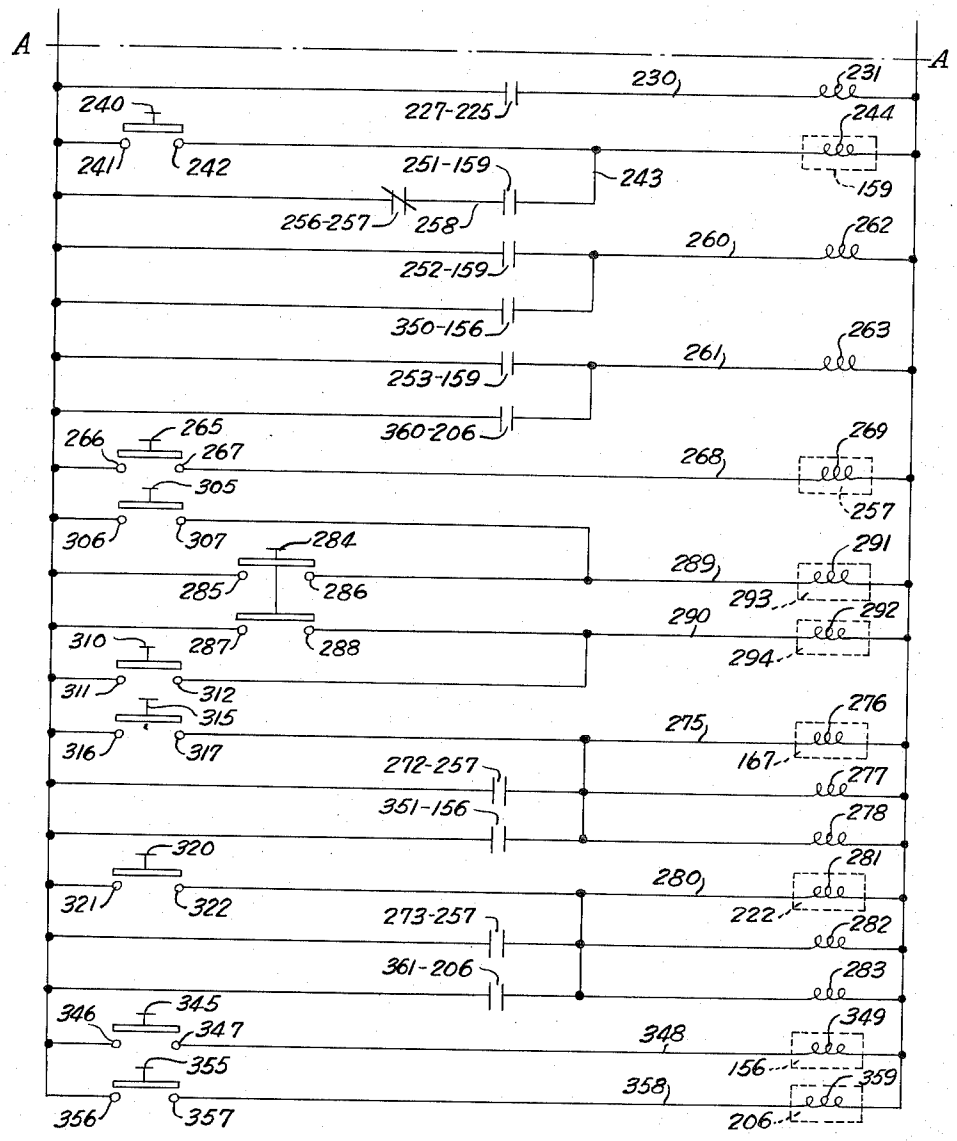

FIG. 4b

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3,198,226

HYDRAULIC VENEER LATHE

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Filed June 5, 1961, Ser. No. 114,746
3 Claims. (Cl. 144—209)

The present invention relates to veneer lathes and more particularly to a veneer lathe comprising hydraulically reciprocated rotatable spindles for holding the log to be cut or peeled.

One of the principal objects of the invention is the provision of a novel and improved veneer lathe having aligned rotatable spindles provided with chucks for holding a log to be cut or peeled and in which at least one of the spindles is reciprocated by a double-acting reciprocating type fluid actuated motor and having high and low pressure fluid sources and solenoid operated valve means for controlling the flow of pressure fluid to the motor including means for automatically connecting the motor to the source of low pressure fluid when disconnected from the source of high pressure fluid whereby the log is held in the lathe during the peeling operation by a lower pressure than that employed in the original chucking of the log.

The invention resides in certain constructions and combinations and arrangements of parts and further objects and advantages will be apparent to those skilled in the art to which it relates from the following description of the preferred embodiment described with reference to the accompanying drawings forming a part of this specification in which similar reference characters designate corresponding parts, and in which:

FIG. 1 is a perspective log side view of a veneer lathe embodying the present invention;

FIG. 2 is a fragmentary sectional view with portions in elevation taken approximately on the horizontal central plane through the left-hand spindles as the lathe is viewed in FIG. 1;

FIG. 3 is a diagrammatic view of the hydraulic system of the lathe; and

FIGS. 4*a* and 4*b* together are a wiring diagram showing the electrical control circuits for the lathe.

While the invention is susceptible of various modifications and alternate constructions, the present preferred embodiment is shown in the drawings and herein described in detail. It is to be understood, however, that there is no intention to thereby limit the invention to the specific form disclosed, but it is my intention to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

The invention is herein illustrated and described as embodied in a more or less conventional lathe and only those parts of the lathe which are necessary to an understanding of the present invention are shown in the drawings and herein described in detail. The parts of the lathe not shown and described per se form no part of the present invention and are well known in the art.

Referring to the drawings, the veneer lathe shown comprises a built-up frame assembly, designated generally by the reference character A and including a rectangular base **10** having upstanding and members **11, 12** at opposite ends thereof, the upper parts of which are separately formed and bolted to the lower parts to facilitate manufacture and assembly of the lathe. A conventional knife, knife bar and pressure bar assembly, designated generally as B, located intermediate the end members **11, 12** is movably and adjustably supported therebetween in the usual manner.

The log to be peeled is supported between two pairs of chucks **20, 21** and **22, 23** detachably fixed to adjacent ends of axially aligned concentric pairs of spindles **24, 25** and **26, 27**, respectively. The outer and larger spindles **24, 25** are tubular and the inner and smaller spindles **26, 27** project therethrough. The chucks **20, 21** which are carried by the tubular spindles **24, 25** are larger than the chucks **22, 23** carried by the inner spindles **26, 27** and are so constructed that the smaller chucks **22, 23** may be retracted or drawn flush with the larger chucks **20, 21**. The spindles are adapted to be moved lengthwise to engage and disengage the chucks carried thereby with the ends of the log and the construction is such that the log may be held by both the large and small pairs of spindles and chucks or solely by the smaller pair of spindles and chucks.

The spindles **25, 27** at the right-hand end of the lathe, as viewed in FIG. 1, are similar in construction to the spindles **24, 26** at the left-hand end of the lathe and are supported, reciprocated and driven in a similar manner. Because of this only the left-hand end of the lathe, which is the end shown in FIG. 2, will be described in detail. The corresponding parts at the right-hand or opposite end of the lathe, except where otherwise designated, are designated by the same reference characters with a prime mark affixed thereto.

The outer spindle **24** is slidably supported intermediate its ends in bearing members **30, 31** fixedly secured in opposite ends of a spindle sleeve or quill **32**. Opposite ends of the spindle quill **32** are rotatable supported in the end member **11** of the frame assembly A by anti-friction bearings **33, 34**. The spindle **24** is keyed to the spindle sleeve or quill **32** by an elongated key **40** located in a slot or aperture in the spindle quill **32** and projecting into an elongated keyway **42** in the spindle **24**. The spindle **26** is slidably keyed to the spindle **24** by an elongated key **44** fixed in an aperture or slot in the spindle **24** and projecting into an elongated keyway **45** in the spindle **26**. The drive wheel **46** is fixedly secured to the spindle sleeve or quill **32** by being bolted or otherwise secured to a radial flange **47** on the spindle sleeve.

The inside or small spindles **26, 27** are provided with centers **48, 49**, which may be slidably supported in the chuck ends thereof for limited movement lengthwise of the spindle and spring biased to a position in which they project beyond the chucks carried by the respective spindle. Such centers force the core log out of the chucks as the chucks are retracted. In the absence of these centers the core may hang onto one or the other of the chucks necessitating manual removal of the core.

The left-hand end of the spindle **24** projects into a cylindrical bore or chamber in the frame assembly A and which is concentric with the spindle and formed by a tubular member **50** forming a part of the frame assembly and interposed between cylinder head members **51, 52**. The right-hand head member **51** is spaced from the left-hand end member **11** of the frame assembly A by a cylindrical member **53** and is detachably but fixedly secured to the end member by a plurality of threaded rods **54**. The cylinder head member **52** is spaced from the member **51** by the tubular member **50** and is detachably but fixedly connected to the member **51** and in turn the end member **11** by threaded rods **55**. The sides of the head members **51, 52** facing one another are provided with flanges concentric with the spindle **24** and which surrounds the adjacent end of the member **50** and retain the parts in proper alignment.

The left-hand end of the spindle **24** projects into the member **50**, or the chamber formed thereby and the members **51, 52**, and has a piston member connected therewith. The piston member, as shown, comprises an

annular member 60 of slightly less diameter than the interior diameter of the member 50 and having a portion 61 of reduced diameter on the side thereof adjacent to the spindle, a counterbore 62 in the other side, and a pair of annular grooves 63, 64 in its exterior within which a pair of piston rings 65, 66 are located. The member 60 is fastened as by screws 67 to the left-hand end of the spindle.

The cylinder member 50 and the cylinder head members 51, 52 together with the left-hand end of the spindle 24 and the piston head, comprising the member 60, the piston rings 65, 66 etc., designated generally by the reference character C, constitute or form the double action fluid actuated motor, designated generally by the reference character D, of the reciprocating type which moves the external or large spindle 24 towards and from the log to be cut, that is, towards or from the center of the lathe. Fluid for actuating the motor D is admitted to and exhausted from opposite ends of the chamber within which the piston C reciprocates by conduits or apertures 70, 71 in the cylinder heads 51, 52, respectively. Fluid is prevented from leaking from the right-hand end of the cylinder chamber formed by the members 50, 51, 52 by a packing gland 75 connected to the right-hand side of the member 51, from the left-hand end of the chamber by a packing gland 76 connected to the left-hand side of the member 52 and surrounding the portion of the small spindle 26 projecting through the member 52, and between the member 60 and the small spindle 26 by a packing gland 77 connected to the left-hand side of the member 60.

The left-hand end of the spindle 26 projects through the piston head member 52 and into a cylindrical bore or chamber in the frame assembly A concentric with the spindle 26 and formed by tubular member 80 forming a part of the frame assembly and interposed between the cylinder head member 52 and a third head member 81. The right-hand head member 81 is spaced from the cylinder head member 52 by the tubular member 80 and is detachably but fixedly connected to the member 52 by threaded rods 82. The sides of the head members 52, 81 facing one another are provided with flanges concentric with the spindle 26 and surrounding the adjacent end of the member 80 for retaining the parts in proper alignment.

The end of the spindle 26 projecting into the member 80 has a piston member, designated generally as E, connected therewith. The piston member E, as shown, comprises an annular member 83 of slightly less diameter than the interior diameter of the member 80 and having a counterbore 84 on the side thereof adjacent to the spindle and into which the end of the spindle projects, a counterbore 85 in its other side, and a pair of annular grooves 86, 87 in its exterior within which a pair of piston rings 90, 91 are located. The member 83 is fastened as by screws 92 to the end of the spindle 26. The reference character 93 designates a bearing sleeve in the head member 52.

The cylinder member 80 and the cylinder head members 52, 81 together with the left-hand end of the spindle 26 and the piston head E, comprising the member 83, the piston rings 90, 91, constitute or form the double action fluid pressure actuated motor, designated generally by the reference character F, of the reciprocating type which moves the internal or smaller spindle 26 towards and from the log to be cut, that is, towards or from the center of the lathe. Fluid is admitted to and exhausted from opposite ends of the motor F by conduits or apertures 94, 95 in the cylinder heads 52, 81, respectively.

Pressure fluid, preferably oil, for operating the spindles at opposite ends of the lathe is supplied from separate pumps 100, 100' driven by an electric motor 102. The pumps are preferably of the variable volume, variable pressure type. The inlet or suction sides of the pumps 100, 100' are connected by conduits 103, 103', respectively, to an oil reservoir or sump 104 and the discharge or pressure sides of the pumps are connected by conduits 105, 105' to solenoid operated three-position, spring centered, four-way control valves 106, 107, and 108, 109, respectively, and solenoid operated two-position, spring biased to closed position, by-pass valves 110, 111, respectively. The valves referred to are connected to the fluid pressure motors D, F, D', F', by suitable conduits and to the sump 104 by a conduit 112 and control the flow of fluid pressure to and from the fluid pressure motors, D, F, D', F'.

The conduit 105 is also conected through a pressure reducing regulator 113 and a conduit 114 to solenoid operated two-position, spring biased to closed position, valves 115, 116 which are in turn connected to the conduits leading to the outer ends of the left-hand fluid motors D, F, respectively, in a manner hereinafter described. In a similar manner the conduit 105' is connected through a pressure reducing valve 113' and a conduit 114' to solenoid operated two-position, spring biased to closed position, valves 115', 116' connected to the outer ends of the right-hand fluid motors D', F'.

Assuming that the spindles are retracted and a log to be peeled has been placed in position therebetween, both pairs of spindles and in turn the chucks carried thereby can be made to move towards the log by the operator depressing the "extend all spindles" push button switch 120 to close its normally open contacts 121, 122 and 123, 124. The closing of contacts 121, 122 establishes a circuit from the power line 125, wire 126 and operating solenoid 127 of relay 128 to line 130 thereby actuating the relay to close its normally open contacts 131, 132, 133, 134. Attention is called to the fact that the various relay contacts are designated on the wiring diagram by the contact number or reference character followed by the relay number or reference character for purposes of better identification of the relay contacts. The closing of the normally open contacts 131, 132 of relay 128 establishes parallel circuits from the line 125 through wires 137, 138 and operating solenoids 141, 142 of valves 106, 107, respectively, to line 130. Energization of the operating solenoids 141, 142 shifts the valves 106, 107 to the left, as viewed in FIG. 3, connecting the pressure supply conduit 105 to conduits 143, 144 leading to the left-hand ends, that is, the outer ends of the motors D, F, respectively, and the conduits 145, 146 connected to the opposite or inner ends of the motors D, F to sump conduit 112. This causes the pistons of the motors D, F and in turn the spindles 24, 26 and the chucks 20, 22 to move towards the log to be cut.

The closing of the normally open contacts 133 of relay 128 establishes a circuit from the line 125 through the now closed contacts 133, wire 150 and operating solenoid 151 of relay 152 to the line 130. Energization of the relay 152 closes its normally open contacts 153, 154. The closing of contacts 153 of relay 152 establishes a holding circuit for the relay from line 125 through the normally closed contacts 155 of relay 156, wire 157, normally closed contacts 158 of relay 159, wire 160 and now closed contacts 153 to wire 150. The closing of contact 154 of relay 152 establishes a circuit from the line 125 through the now closed contacts 154, wire 161 and operating solenoid 162 of valve 115 to line 130. Energization of the operating solenoid 162 of valve 115 shifts the valve to connect the fluid supply line 105 through the pressure reducing regulator or valve 113 and the conduit 114 leading to the valve 115 to conduit 163 connected to the conduit 143 through a check valve 164. The check valve 164 prevents the flow of fluid from the conduit 143 to the conduit 163. While the push button switch 120 is held depressed, fluid is supplied to the conduit 143 at a pressure greater than the pressure in the conduit 163 but when the switch 120 is released

and valve 106 returns to its neutral position valve 115 maintains a reduced pressure in conduit 143 and the left-hand end of the motor D.

The closing of the normally open contacts 134 of relay 128 establishes a circuit from the line 125 through the now closed contacts 134, wire 165, normally closed contacts 166 of relay 167, wire 168, operating solenoid 169 of relay 170 to the line 130. Energization of the relay 170 closes its normally open contacts 171, 172. The closing of contacts 171 of relay 170 establishes a holding circuit for the relay from line 125 through the normally closed contacts 173 of relay 156, wire 174 and now closed contacts 171 of relay 170 to wire 165. The closing of contact 172 of relay 170 establishes a circuit from the line 125 through the now closed contacts 172, wire 177 and operating solenoid 178 of valve 116 to line 130. Energization of the operating solenoid 178 of valve 116 shifts the valve to connect the fluid supply line 105 through the pressure reducing regulator or valve 113 and the conduit 114 leading to the valve 116 to conduit 179 connected to the conduit 144 through a check valve 180. The check valve 180 prevents the flow of fluid from the conduit 144 to the conduit 179. While the switch 120 is held depresed, fluid is supplied to the conduit 144 at a pressure greater than the pressure in conduit 179. The opening of the valve 116, therefore, performs no function, but when the switch 120 is released and valve 107 returns to its off position, valve 116 maintains a reduced presure in conduit 144 and the left-hand end of the motor F.

The closing of the second pair of contacts 123, 124 of the "extend all spindles" push button switch 120 simultaneously with the closing of the contacts 121, 122 thereof established a circuit from the line 125 through wire 181 and operating solenoids 182 of relay 183 to line 130, actuating the relay to close its normally open contacts 184, 185, 186, 187. The closing of the normally open contacts 184, 185 of relay 183 establishes circuits from the line 125 through the wires 190, 191 and operating solenoids 192, 193 of valves 108, 109, respectively, to line 130.

Energization of the solenoids 192, 193 shifts the valves 108, 109 towards the left connecting the pressure fluid supply conduit 105' to the conduits 194, 195, leading to the right-hand ends, that is, the outer ends of the motors D', F'. Simultaneously with the connection of the ends of the motors D', F', with the pressure supply conduit 105' the opposite ends thereof are connected to the sump conduit 112 by the conduits 196, 197, respectively. This causes the motors to move the spindles 25, 27 and in turn the chucks 21, 23 carried thereby towards the log. The construction and arrangement of the hydraulic system including the adjustment of the pumps 100, 100' and the relative sizes of the various conduits is preferably such that the small spindles and chucks do not advance faster than the large spindles and chucks when both pairs of spindles of either end of the lathe are advanced simultaneously.

The closing of the normally open contacts 186 of relay 183 establishes a circuit from the line 125 through the now closed contacts 186, wire 200 and operating solenoid 201 of relay 202 to the line 130. Energization of the relay 202 closes its normally open contacts 203, 204. The closing of contacts 203 of relay 202 establishes a holding circuit for the relay from line 125 through the normally closed contacts 205 of relay 206, wire 207, now normally closed contacts 208 of relay 159, wire 209 and now closed contacts 203 of relay 202, to wire 200. The closing of contact 204 of relay 202 establishes a circuit from the line 125 through the now closed contacts 204, wire 210 and operating solenoid 211 of valve 115' to line 130. Energization of the operating solenoid 211 of valve 115' shifts the valve to connect the fluid supply line 105' through the pressure reducing regulator or valve 113' and the conduit 114' leading to the valve 115' to conduit 212 connected to the conduit 194 through a check valve 213. The check valve 213 prevents the flow of fluid from the conduit 194 to the conduit 212. While the push button switch 120 is held depressed, fluid is supplied to the conduit 194 at a pressure greater than the pressure in the conduit 212 but when the switch 120 is released and valve 108 returns to its neutral position valve 115' maintains a reduced pressure in conduit 194 and the left-hand end of the motor D'.

The closing of the normally open contacts 187 of relay 183 establishes a circuit from the line 125 through the now closed contacts 187, wire 220, normally closed contacts 221 of relay 222, wire 223, operating solenoid 224 of relay 225 to the line 130. Energization of the relay 225 closes its normally open contacts 226, 227. The closing of contacts 226 of relay 225 establishes a holding circuit for the relay from line 125 through the normally closed contacts 228 of relay 206, wire 229 and now closed contacts 226 of relay 225 to wire 220. The closing of contact 227 of relay 225 establishes a circuit from the line 125 through the now closed contacts 227, wire 230 and operating solenoid 231 of valve 116' to line 130. Energization of the operating solenoid 231 of valve 116' shifts the valve to connect the fluid supply line 105' through the pressure reducing regulator or valve 113' and the conduit 114' leading to the valve 116' to conduit 232 connected to the conduit 195 through a check valve 233. The check valve 233 prevents the flow of fluid from the conduit 195 to the conduit 232. While the switch 120 is held depressed, fluid is supplied to the conduit 195 at a pressure greater than the pressure in conduit 232. The opening of the valve 116', therefore, performs no function, but when the switch 120 is released and valve 109 returns to its off position, valve 116' maintains a reduced pressure in conduit 195 and the right-hand end of the motor F'.

After the log is chucked the spindles are rotated and the peeling operation commenced. The peeling is continued with both pairs of chucks in engagement with the log under reduced pressure until the diameter of the log closely approaches that of the larger chucks 20, 21 whereupon the operator depresses the "retract both large spindles" push button switch 240 to close its normally open contacts 241, 242, establishing a circuit from the line 125 through wire 243 and operating solenoid 244 of relay 159 to line 130 thereby actuating the relay to open its normally closed contacts 158, 208 and close its normally open contacts 251, 252, 253.

The opening of the normally closed contacts 158, 208 of relay 159 breaks the holding circuit for relays 152, 202 allowing the normally open contacts 153, 154 of relay 152 and 203, 204 of relay 202 to reopen. The opening of the normally open contacts 153, 203 of relays 152, 202 prevents the holding circuits therefore from reclosing upon the subsequent deenergization of the relay 159.

The opening of contacts 154 of relay 152 and 204 of relay 202 breaks the circuits therethrough for the solenoids 162 and 211, thus allowing valves 115, 115' to return to their inoperative positions, disconnecting the motors D, D' from low pressure fluid supply lines 114, 114'. The chucks continue in tight engagement with the log, however, because the hydraulic fluid present in the motors at the time the valves return to their neutral positions remains trapped therein.

The closing of the normally open contacts 251 of relay 159 establishes a holding circuit for the relay 159 from the line 125 through normally closed contacts 256 of relay 257, wire 258 and now closed contacts 251 of relay 159 to wire 243. The closing of contacts 252, 253 of relay 159 establishes two parallel circuits from the line 125, through the now closed contacts 252, 253, wires 260, 261 and solenoids 262, 263 of valves 106, 108, respectively. Energization of the solenoids 262, 263 of valves 106, 108 shifts the valves to the right, as viewed in FIG. 3, connecting the pressure conduits 105, 105' to conduits 145, 196 leading to the inner ends of the

motors D, D', respectively, and the sump conduit 112 to the conduits 143, 194 leading to the opposite ends of the motors, causing the motors to withdraw the spindles 24, 25 into their quills and the chucks 20, 21 carried thereby from the log being cut. The holding circuit for relay 159 assures complete retraction of the large spindles and the chucks 20, 21 carried thereby and their retention in retracted position during the remainder of the peeling operation.

The lathe continues to operate with the log being held by the small spindles and chucks 22, 23. When the knife approaches closely to these chucks the operator depresses the "retract both small spindles" push button switch 265 to close its normally open contacts 266, 267, thus establishing a circuit from the line 125 through the wire 268 and operating solenoid 269 of relay 257 to line 130 actuating the relay to open its normally closed contacts 256, and close its normally open contacts 272, 273. The closing of normally open contacts 272 of relay 257 establishes a circuit from the line 125 through the now closed contacts 272 of relay 257, wire 275, operating solenoid 276 of relay 167, operating solenoid 277, of valve 107 and operating solenoid 278 of valve 110 to line 130. The operating solenoids 276, 277, 278 are in parallel circuit between the wire 275 and the line 130. Energization of the operating solenoid 276 of relay 167 actuates the relay to open its normally closed contacts 166 thus breaking the holding circuit of relay 170 allowing its normally open contacts 171, 172 to reopen. The opening of contacts 171 prevents reenergization of the relay 170 upon the subsequent deenergization of relay 167. The opening of contacts 172 of relay 170 deenergizes the operating solenoid 178 of valve 116 allowing the valve to return to its off position.

Energization of the operating solenoids 277, 278 of valve 107, 110 shifts the valves to the right, as viewed in FIG. 3, connecting the pressure supply conduit 105 to the conduit 146 leading to the inner end of the motor F and the sump conduit 112 to the conduits 143, 144 leading to the opposite or outer ends of the motors D, F. This causes the motor F to retract the left-hand small spindle 26 and the chuck 23 carried thereby to release the core log remaining in the lathe.

The closing of normally open contacts 273 of relay 257 establishes a circuit from the line 125 through the now closed contacts 273 of relay 257, wire 280, operating solenoid 281 of relay 222, operating solenoid 282 of valve 109 and operating solenoid 283 of valve 111 to line 130. The operating solenoids 281, 282, 283 are in parallel circuit between the wire 280 and the line 130. Energization of the operating solenoid 281 of relay 222 actuates the relay to open its normally closed contacts 221 thus breaking the holding circuit for relay 225 allowing its normally open contacts 226, 227 to reopen. The opening of contacts 226 prevents reenergization of the relay 225 upon the subsequent deenergization of relay 222. The opening of contacts 227 of relay 225 deenergizes the operating solenoid 231 of valve 116' allowing the valve to return to its off position.

Energization of the operating solenoids 282, 283 of valve 109, 111 shifts the valves to the right, as viewed in FIG. 3, connecting the pressure supply conduit 105' to the conduit 197 leading to the inner end of the motor F' and the sump conduit 112 to the conduits 194, 195 leading to the opposite or outer ends of the motors D', F'. This causes the motor F' to retract the right-hand small spindle 27 and the chuck 23 carried thereby. Movement of the small spindles 26, 27 in the direction to retract the same continues as long as the push button switch 265 is maintained depressed or until the motors F, F', connected thereto, reach the ends of their movement.

The small chucks are preferably of such a size that they cannot be retracted into the large spindles and the purpose of the valves 110, 111 is to allow the large spindles to retract with the small spindles in the event the operator retracts the small spindles with the large spindles extended.

Both of the small spindles 26, 27, can be extended independently of the large spindles by depressing the "extend both small spindles" push button switch 284 having normally open contacts 285, 286, 287, 288. The depressing of push button switch 284 to close its normally open contacts, referred to, establishes two parallel circuits from the line 125, now closed contacts of push button switch 284, wires 289, 290 and operating solenoids 291, 292 of relay 293, 294, respectively, to line 130.

The energization of the operating solenoid 291 of relay 293 actuates the relay to close its normally open contacts 295, 296. Contacts 295 of relay 293 are in parallel circuit with contacts 132 of relay 128 between the line 125 and the wire 138 and their closing energizes the operating solenoid 142 of solenoid operated valve 107 to shift the valve to the left, as viewed in FIG. 3, to connect the high pressure fluid supply conduit 105 to the conduit 144 leading to the left or outer end of the cylinder F. Simultaneously, the conduit 146, connected to the opposite end of the motor F, is connected to the sump conduit 112. This causes the left-hand small spindle 26 to move towards the center of the lathe. Contacts 296 of relay 293 are in parallel circuit with contacts 134 of relay 128 between the line 125 and wire 165 and their closing energizes the operating solenoid 169 of relay 170, the operation of which in turn energizes the operating solenoid 178 of valve 116 in a manner previously described to shift the valve 116 to the left, as viewed in FIG. 3, connecting the conduit 144 to the low pressure source of fluid pressure 114.

The energization of the operating solenoid 292 of relay 294 actuates the relay to close its normally open contacts 300, 301. Contacts 300 of relay 294 are in parallel circuit with contacts 185 of relay 183 between the line 125 and the wire 191 and their closing energizes the operating solenoid 193 of valve 109 to shift the valve to the left, as viewed in FIG. 3, to connect the fluid pressure supply conduit 105' to the conduit 195 leading to the right or outer end of the cylinder F'. Simultaneously the conduit 197, connected to the opposite end of the motor F', is connected to the sump conduit 112. This causes the small spindle 27 at the right-hand end of the lathe to move towards the center of the lathe. Contacts 301 of relay 294 are in parallel circuit with contacts 187 of relay 183 from the line 125 to wire 220, and the closing thereof energizes operating solenoid 224 of relay 225 which in turn energizes the operating solenoid 231 of valve 116' in a manner previously described to shift the valve 116' to the left, as viewed in FIG. 3, connecting the conduit 195 to the low pressure source of fluid pressure 114'.

Movement of the small spindles 26, 27 towards the center of the lathe continues under high pressure fluid as long as push button switch 284 is held depressed or until the motors F, F' reach the end of their movement. There-after fluid at reduced pressure will be supplied to the outer ends of the motors F, F' through the valves 116, 116'. The small spindles 26, 27 and the chucks carried thereby can be retracted by the operator depressing the retract both small push button switch 265, as previously explained. This energizes relays 167, 222, opening the normally closed contacts 166, 221 thereof thus breaking the holding circuits for the relay 170, 225 which in turn deenergizes the operating solenoids 178, 231 of valves 116, 116', allowing the valves to return to their off position. The closing of contacts 272, 273 of relay 257 energizes the operating solenoids 277, 282 of valves 107, 109, respectively, reversing the direction of flow of fluid to the motors F, F'.

Small spindle 26, at the left-hand end of the lathe, can be extended alone by the operator depressing the "extend small left-hand spindle" push button switch 305. The contacts 306, 307 of switch 305 are in parallel circuit with

the contacts 285, 286 of push button switch 284 and the small spindle at the right-hand end of the lathe can be extended by depressing the "extend small right-hand spindle" push button switch 310, the contacts 311, 312 of which are in parallel circuit with the contacts 287, 288 of push button switch 284. The small left-hand spindle 26 can be retracted at any time that it is extended by the operator depressing the "retract small left-hand spindle" push button switch 315 to close its normally open contacts 316, 317 which are in parallel circuit with the contacts 272 of relay 253 between the line 125 and the wire 275.

The small right-hand spindle can be retracted at any time by the operator depressing the "retract right-hand spindle" push button switch 320 to close its normally open contacts 321, 322 which are in parallel circuit with the contacts 273 of relay 257 between the line 125 and the wire 280.

With the small spindles 26, 27 extended, the large spindles may be subsequently extended by the operator depressing the "extend all spindles" push button switch 120. This permits chucking of the log by the small spindles and the subsequent engagement of the log with the large spindles.

If it is desired to extend simultaneously merely the two spindles at the left-hand end of the lathe without disturbing the position of the spindles at the right-hand end of the lathe the operator depresses the "extend both left-hand spindles" push button switch 330 to close its normally open contacts 331, 332. These contacts are in parallel circuit with the contacts 221, 222 of push button switch 120 between the line 125 and the wire 126. This causes both motors D and F to be actuated in the manner previously described to advance the spindles 24, 26 connected thereto, and in turn the chucks 20, 22 carried thereby towards the center of the lathe.

The spindles at the opposite or right-hand side of the lathe can be simultaneously extended by depressing the "extend both right-hand spindles" push button switch 340 to close its normally open contacts 341, 342 which are in parallel circuit with the contacts 123, 124 of push button switch 120 between the lines 125 and the wire 181. This causes both motors D' and F' to be actuated in the manner previously described to advance the spindles 25, 27 connected thereto and in turn the chucks 21, 23 carried thereby towards the center of the lathe.

Both spindles 24, 26 at the left-hand end of the lathe can be retracted simultaneously by depressing the "retract both left-hand spindles" push button switch 345 to close its normally open contacts 346, 347, thereby establishing a circuit from the line 125 through its now closed contacts 346, 347, wire 348 and operating solenoid 349 of relay 156 to line 130. Energization of relay 156 actuates the relay to open its normally closed contacts 155, 173 and close its normally open contacts 350, 351. The opening of the normally closed contacts 155, 173 of relay 156 breaks the holding circuit for relays 152, 170 thereby allowing the valves 115, 116 to return to their off positions. The closing of contacts 350 of relay 156, which are in parallel circuit with the contacts 252 of relay 159 energizes the operating solenoid 262 of valve 106 to cause the motor D to retract the large spindle 24 and the closing of contacts 351 of relay 156, which are in parallel circuit with the contacts 272 of relay 257, energizes the operating solenoid 277 of valve 107 to cause the motor F to retract the small spindle 26.

Both spindles 25, 27, at the right-hand end of the lathe, can be simultaneously retracted by the operator depressing the "both right-hand spindles" push button switch 355 to close its normally closed contacts 356, 357, thereby establishing a circuit from the line 125 to wire 358 through the operating solenoid 359 of relay 206 to the line 130. Actuation of the relay 206 opens its normally closed contacts 205, 228 and closes its normally closed contacts 360, 361. The opening of the normally closed contacts 205, 228 break the holding circuits for the relays 202, 225 which in turn deenergizes the operating solenoid 211 of valve 115' and operating solenoid 231 of valve 116' allowing the valves to return to their off positions. The closing of the normally open contacts 360, which are in parallel circuits with the contacts 253 of relay 159 energizes the operating solenoid 263 of valve 108 shifting the valve to the right to cause the motor D' to retract the large spindle 25 and the closing of contacts 361 of relay 206 which are in a parallel circuit with the contacts 273 of relay 257, energizes the operating solenoid 282 of valve 109 to cause the motor F' to retract the small spindle 27. The spindles continue to retract as long as the push button switch 355 is held depressed.

The spindles can be positioned in any desired projection or position by first advancing them and then retracting them to the desired position.

One of the novel features of the control disclosed is the fact that reduced pressure is maintained on the spindles during the cutting operation thus permitting a higher pressure to be employed to initially seat the chucks in the logs than might be desirable during the peeling operation, particularly near the end of the operation, as the log may bend if too high a pressure is employed upon the spindles. The pressure reducing regulators 113, 113' are adjustable as are the pumps 100, 101 and are preferably such that pressures from 300 to 600 pounds per square inch, and more, can be employed to initially seat the chucks in the log, and the chucks maintained engaged with the log during the cutting operation at substantially less pressure, for example, with pressures from 50 to 300 pounds per square inch.

Full pressure may be maintained in the fluid pressure actuated motors during the cutting operation, if desired, by providing suitable holding circuits for relays 128, 183 and a selecting switch by which the operator may either insert or remove these circuits from the control and simultaneously remove the relays 152, 170, 202, 225 from the circuit when the holding circuits, referred to, are inserted in the control.

As an alternative arrangement, the holding pressures can be removed entirely by providing a selector switch, by the use of which the operator can remove the relays 152, 170, 202, 225 from the circuit.

From the foregoing description of the preferred embodiment of the invention it will be apparent that the pistons for the fluid actuated motors, which reciprocate the spindles, are integral with the spindles, that is, the spindles and the piston of the fluid motor associated therewith in each instance is a unit. In the lathe disclosed no thrust bearings are employed and the pistons rotate within their respective cylinders. The absence of thrust bearings between the pistons and the chucks as well as the features including the construction of the pistons shown and disclosed in this application are the subject of a copending application, Serial No. 401,940, filed October 6, 1964, as a divisional application or a continuing application of part of this application and are therein claimed. The piston rings are preferably made of a material different from that of either the piston proper or the cylinder wall, and a material which will not gall and thus interfere with movement of the piston ring relative to either the piston or the cylinder wall within which they reciprocate. In the preferred embodiment the grooves in the piston within which the piston rings are located are relatively deep as compared to that employed in conventional reciprocating type fluid motors using piston rings. The depth of the grooves is preferably about one and one-half times the thickness of the rings and the clearance between the piston rings and the bottom of the grooves, within which they are located, is preferably about twice the clearance of the piston members proper in the cylinders within which they reciprocate.

The invention is applicable to veneer lathes having one pair of spindles as distinguished from the two pairs em-

ployed in the preferred embodiment illustrated and to veneer lathes in which either a single or double spindle, depending upon the construction employed, at one end of the lathe is fluid actuated and the spindle or spindles at the other end actuated or reciprocated by some other means, for example, a screw and nut or screw and nut device. Where axially aligned spindles are reciprocated by reciprocating-type fluid motors, fluid is preferably supplied to the respective motors by discrete pumps delivering equal quantities of fluid so that the spindles may be moved toward or away from one another at the same or substantially the same rate.

While the preferred embodiment of the invention has been described in considerable detail the invention is not limited to the particular construction shown or described.

Having thus described my invention, what I claim is:

1. In a veneer lathe, a frame, a pair of spaced axially aligned quills rotatably supported in said frame, means for rotating said quills, spindles slidably but non-rotatably supported in said quills and adapted to have chucks connected to their adjacent ends, a reciprocating type double acting fluid actuated motor means operatively connected to the end of one of said spindles which is non-adjacent to the other of said spindles, solenoid operated valve means for controlling the flow of pressure fluid to and from said fluid pressure actuated motor means, means for actuating said valve means to connect the outer ends of said motors means to a source of high pressure fluid to effect relative movement between said spindles in the direction to move them towards one another, and means for automatically connecting said fluid actuated motor means to a source of low pressure fluid when disconnected from said high pressure fluid source.

2. In a veneer lathe, a frame, a pair of spaced axially aligned quills rotatably supported in said frame, means for rotating said quills, spindles slidably but non-rotatably supported in said quills and adapted to have chucks connected to their adjacent ends, reciprocating type double acting fluid actuated motor means operatively connected to the ends of said spindles which are non-adjacent to one another, solenoid operated valve means for controlling the flow of pressure fluid to and from said fluid pressure actuated motor means, means for actuating said valve means to connect the outer ends of said motor means

to a source of high pressure fluid whereby said spindles are moved towards one another, and means for automatically connecting said fluid actuated motor means to a source of low pressure fluid when disconnected from said high pressure fluid source.

3. In a veneer lathe, a frame assembly, a pair of spaced axially aligned quills rotatably supported in said frame assembly, means for rotating said quills, a first pair of axially aligned spindles slidably but non-rotatably supported in said quills and adapted to have chucks detachably connected to their ends adjacent to one another, a first reciprocating type double acting fluid actuated motor means having a first cylinder, a first piston member reciprocably in said first cylinder, means for connecting said first piston member with one of said spindles of said first pair of spindles, a second pair of axially aligned spindles slidably but non-rotatably supported within said first pair of spindles and adapted to have chucks detachably connected to their ends adjacent to one another, a second reciprocating type double acting fluid actuated motor means having a second cylinder, a second piston member reciprocable in said second cylinder, means connecting said piston member with one of said spindles of said second pair of spindles, a high pressure source of fluid, a low pressure source of fluid, and means including solenoid operated valve means for connecting said motor means to said high and low pressure fluid sources and including means for automatically connecting said motor means to said low pressure source of fluid when disconnected from said high pressure source.

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