Dec. 1, 1953

T. H. BALCH ET AL

REMOTE CONTROL OF SAWMILL SETWORKS BY ELECTROMECHANICAL MEANS

2,661,036

Filed Feb. 12, 1951

3 Sheets-Sheet 1

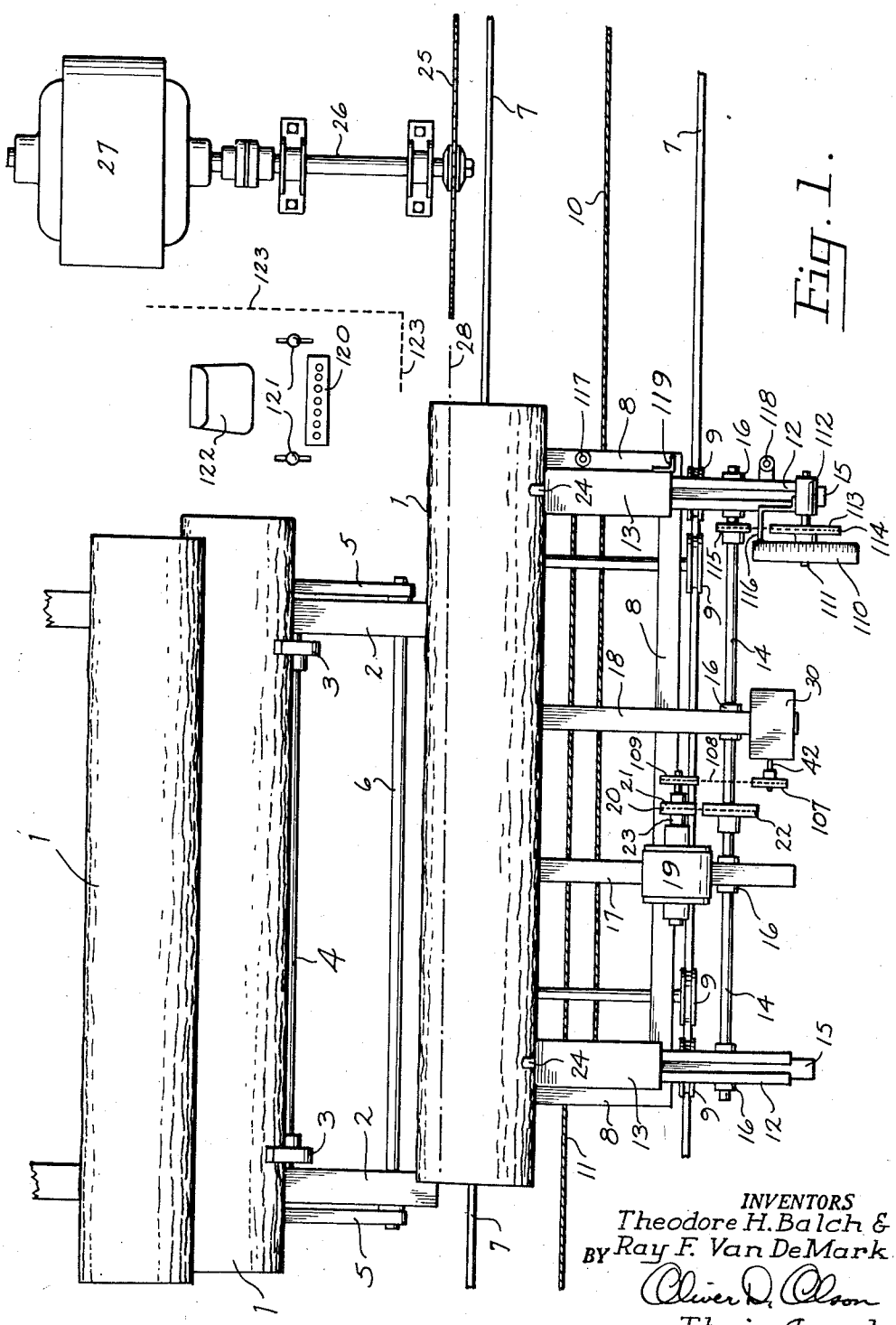

Fig. 1.

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3 Sheets-Sheet 2

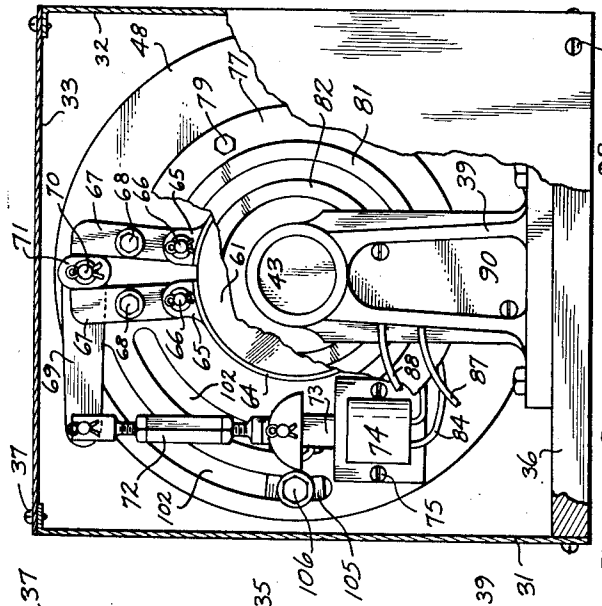

Fig. 3.

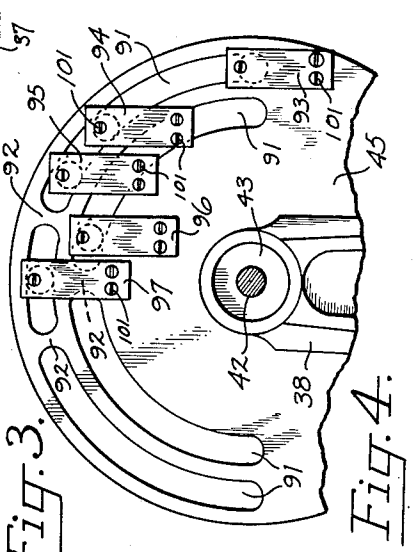

Fig. 4.

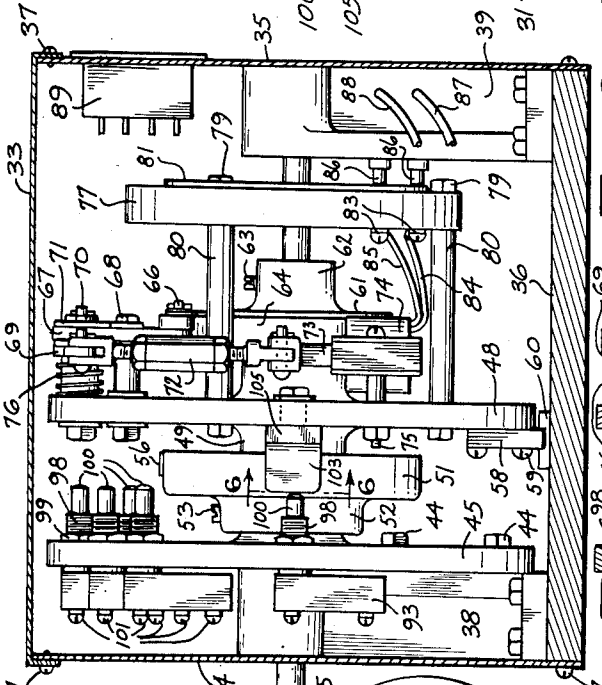

Fig. 2.

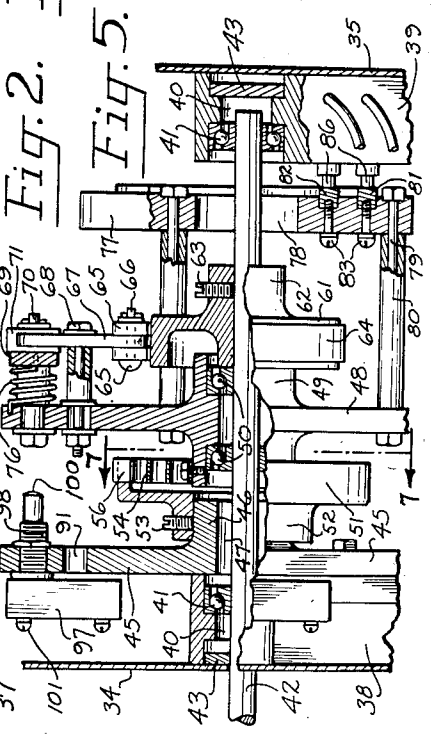

Fig. 5.

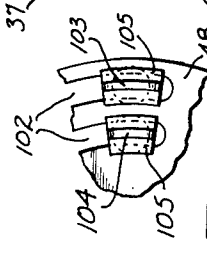

Fig. 6.

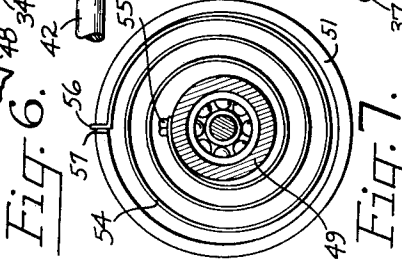

Fig. 7.

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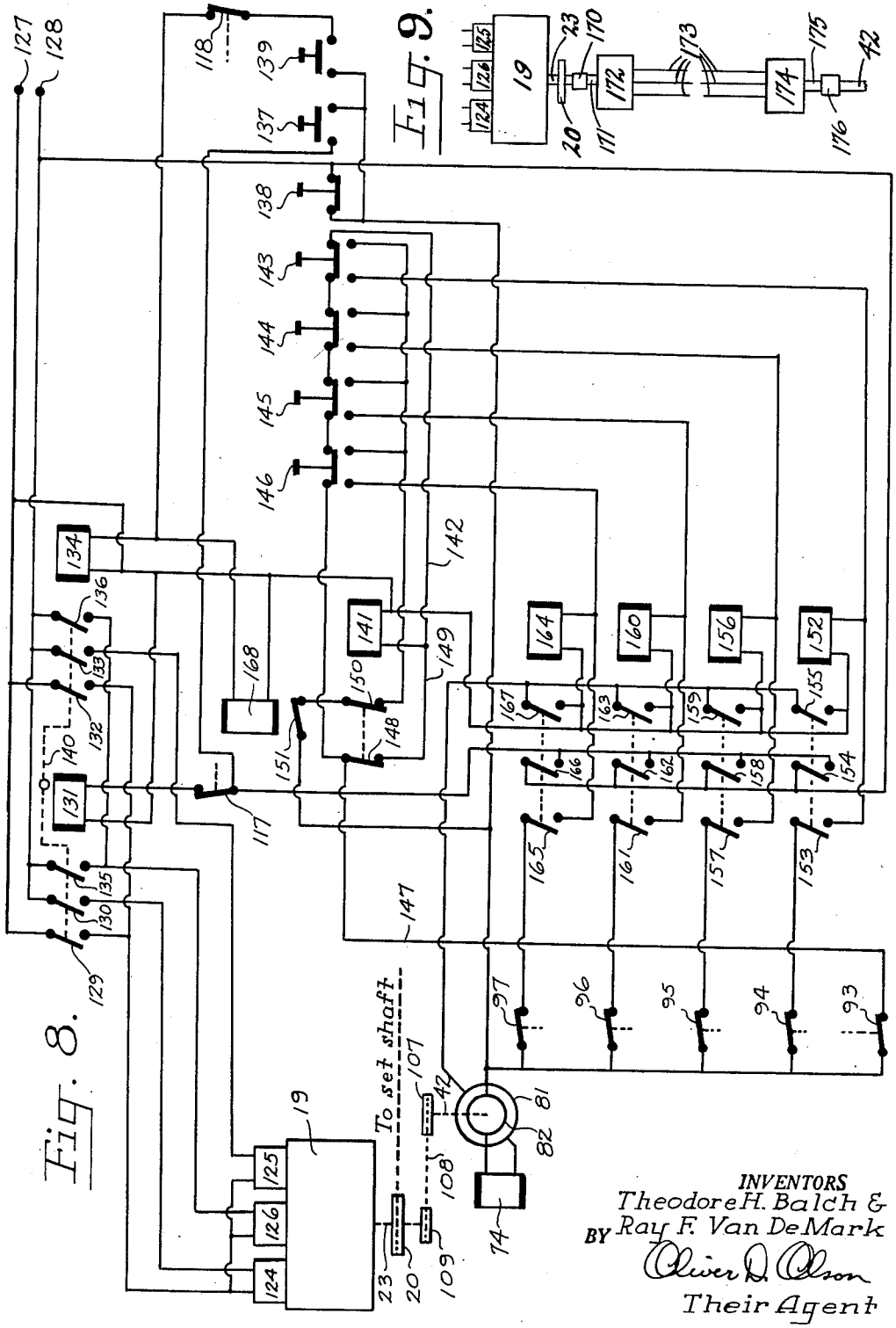
3 Sheets-Sheet 3



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2,661,036

UNITED STATES PATENT OFFICE

2,661,036

REMOTE CONTROL OF SAWMILL SETWORKS BY ELECTROMECHANICAL MEANS

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Application February 12, 1951, Serial No. 210,582

23 Claims. (Cl. 143—120)

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This invention pertains to setworks, and relates particularly to the novel construction of a sawmill setworks by which the operation of a sawmill carriage assembly may be controlled from a remote position.

There are many types of machines in each of which the fundamental basis of operation involves the relative adjustment between a work support and a cooperating working tool. In some machines this adjustment is afforded by movement of the work support relative to a fixed working tool, while in other machines the working tool is adjustable with respect to a fixed work support. Still other machines provide for movement of both the work support and the working tool. In general, such movement of working parts is achieved by the rotation, i. e. angular displacement, of a driven shaft, and it is to this type of machine that the present invention is applied with particular advantage.

For purposes merely of illustration the present invention is described hereinafter with particular reference to sawmill setworks. Since, as explained hereinbefore, various other types of machines operate upon the same basic principle, the specific reference to sawmill setworks is not intended as a limitation upon the scope of this invention.

Briefly, the construction and operation of a conventional sawmill carriage assembly is as follows: The carriage is a wheeled framework supported upon spaced rails which guide the carriage back and forth past a powered saw. The carriage includes a plurality of spaced head blocks upon which to support a log intended to be sawed into boards. Retractible dogs secure the log releasably in abutment with knees which are mounted slidably upon the head blocks and coupled to a power driven set shaft through lead screws or knee chains. By selective rotation of the set shaft, as controlled by the operator, the knees, and hence the log, are moved forward or rearward with respect to the saw.

The selective control of the set shaft is achieved by means of setworks, many types of which are well-known in the art. However, there is a fundamental principle of operation common to all of these prior setworks, namely, they are mounted upon and are required to be operated from the moving carriage. Thus, it is necessary that the operator be stationed upon and ride with the carriage in order to operate the setworks of the prior art. This arrangement is not only uncomfortable for the operator, but it also exposes him to the extreme hazards of flying particles such as occurs, not infrequently, with the breakage of a saw blade.

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It is a principal object of the present invention, therefore, to provide a setworks whereby the operation of the sawmill carriage assembly may be controlled from the safety of a remote position.

Another important object of this invention is the provision of a setworks in which adjustment for each succeeding cut of the log is made merely by pressing properly identified push buttons. By this provision the linear footage production of lumber from the mill is increased substantially and possible error in adjustment is completely obviated.

A further important object of the present invention is the provision of a setworks which affords complete control of the sawmill carriage assembly by but one operator, thereby obviating the loss of time and the presentation of hazards ordinarily attending the operation of a carriage by a crew.

A still further object of this invention is to provide a setworks constructed of a minimum of parts, which is sturdily built for long operating life and which is capable of effecting rapid and precise adjustment of the set shaft.

A general object of this invention is the provision of a device for controlling from a remote position the selective angular displacement of a rotary shaft.

These and other objects and advantages of the present invention will appear from the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a fragmentary plan view of a sawmill showing incorporated therewith a setworks embodying the features of the present invention;

Figure 2 is a front elevation of the setworks illustrated generally in Figure 1 with the front case panel removed to expose the operating parts;

Figure 3 is an end view of the setworks as viewed from the right in Figure 2, parts being broken away to disclose details of construction;

Figure 4 is a fragmentary end view of the setworks as viewed from the left in Figure 2, with the case wall removed to expose the operating parts;

Figure 5 is a fragmentary front elevation of the setworks shown in Figure 2, parts thereof being broken away to disclose details of construction;

Figure 6 is a fragmentary end view taken along the line 6—6 in Figure 2;

Figure 7 is a sectional view taken along the line 7—7 in Figure 5; and

Figure 8 is a schematic diagram of the electrical control circuits of the setworks; and

Figure 9 is a foreshortened fragmentary schematic diagram illustrating an alternative arrangement for interconnecting the setworks control and the set shaft drive motor.

Referring particularly to Figure 1 of the drawings, there is shown for purposes of illustration the general details of one form of conventional sawmill. The sawmill includes a log deck upon which logs 1 are deposited, as from a millpond, preparatory to cutting. The log deck comprises the spaced deck skids 2, the cradle type stop and loaders 3 secured to the shaft 4 and the log loaders 5 secured to the shaft 6. The shafts 4 and 6 are driven by motor means (not shown) in manner well-known in the art.

Adjacent the forward end of the log deck and extending perpendicularly with respect thereto is a pair of spaced parallel rails 7. A log carriage framework 8 is supported upon the rails by wheels 9 and is drawn forwardly and rearwardly thereon by cables 10 and 11, respectively, each of which is secured at one end to the framework and at the other end to a power winch (not shown).

Extending transversely of the carriage framework are spaced head blocks 12 upon which a log 1 is deposited from the log deck. An upstanding knee 13 is supported slidably upon each head block for longitudinal movement over the latter. The knees are connected to a power driven set shaft 14 by any conventional means such as the lead screws 15 or knee chains. The set shaft extends longitudinally of the carriage and is journaled in bearings 16 supported by the head blocks 12 and by the intermediate frame members 17, 18. In the carriage assembly illustrated the set shaft is driven by means of an air motor 19 mounted upon the frame member 17. The motor is coupled to the set shaft by chain 20 reeved over sprocket wheels 21 and 22 secured, respectively, to the drive shaft 23 of the motor 19 and to the set shaft 14. It will be apparent to those skilled in the art that an electric or other type of drive motor may be substituted for the air motor illustrated and that various other types of coupling means may be employed, as desired.

The log 1 is arranged upon the head blocks 12 in abutment with the knees 13 and is secured releasably in that position by the retractable dogs 24 mounted in the knees. In this manner the log is rendered movable with the knees as the latter are actuated by rotation of the set shaft 14.

A saw blade 25 is arranged adjacent the forward rail in such manner as to clear the head blocks 12 as the carriage is moved along the rails. The saw blade illustrated in Figure 1 is of the circular type mounted upon an arbor 26 which is driven by motor 27. It will be understood by those skilled in the art that other types of saw blades, such as the band saw blade, may be employed as desired.

Preparatory to cutting the log, the knees are moved forward, i. e. toward the saw blade 25, a distance sufficient to cause the log to intercept the plane 28 of the saw blade to the extent required for making the desired slab cut, as indicated by the dot-and-dash line in Figure 1. This controlled movement of the knees is effected by the selective rotation of the power driven set shaft, and it is this rotation of the set shaft that is regulated by setworks.

As stated hereinbefore, the setworks of the prior art are mounted upon the movable carriage, thus making it necessary for the operator to ride with the carriage. It is a particular advantage, on the other hand, that the setworks of the present invention may be operated from a remote position with respect to the carriage, as explained in detail hereinafter.

In Figure 1 of the drawings the operating mechanism of the present setworks is illustrated generally by the case 30 mounted upon the intermediate frame member 18 of the carriage. Referring now to Figures 2 and 3, the case comprises the front wall 31, the rear wall 32, the top 33, the side walls 34 and 35 and the bottom 36. The several parts of the case are formed as separate panels secured together detachably by screws 37 to facilitate maintenance and adjustment of the mechanism contained therein.

Mounted upon the bottom 36 adjacent the side panels 34 and 35 are the standards 38 and 39, respectively. The enlarged upper ends of the standards are provided with transverse stepped bores 40 arranged in axial alignment. A self-aligning bearing 41 is mounted in the transverse bore of each standard. A shaft 42 is supported adjacent its ends for axial rotation in the bearings 41. As best shown in Figure 5, the shaft terminates within the bore of standard 39, while the opposite end of the shaft extends outwardly through a hole provided in the side panel 34. The outer end of the transverse bores are provided with dust seals 43.

Secured to the standard 38 by bolts 44 is a disc 45. The hub 46 of the disc is provided with a transverse bore 47 of larger diameter than the shaft 42, whereby to receive the latter freely therethrough. A second disc 48 having a transversely bored hub 49 is mounted for free rotation about shaft 42 upon the spaced bearings 50. The discs 45 and 48 are arranged in spaced cooperative relation for purposes explained in detail hereinafter.

A hollow housing 51 is secured at its hub 52 to the hub 46 of the fixed disc 45 by set screw 53. The rim of the housing projects toward the rotary disc 48 and overlaps a portion of the rotary disc hub 49 in spaced concentric relation. A helical spring 54 is secured at its inner end to the rotary disc hub 49 as by bolt 55. The outer end 56 of the spring is bent radially outward and is received within a slot 57 formed in the rim of the housing, as best shown in Figure 7. By this arrangement of the spring 54, the hub 49, and therefore the rotary disc 48, is urged to rotate in a counterclockwise direction as viewed in Figure 7. The extent of this counterclockwise rotation is restricted by the provision of a bar 58 secured to the disc 48 by screws 59 and arranged to abut against the bumper 60 mounted upon the bottom of the case. When in this condition of abutment, the setworks is in its normal, unenergized position of rest.

A clutch drum 61 is secured at its hub 62 to shaft 42 by set screw 63. The drum is disposed adjacent the rotary disc 48 on the side thereof opposite the spring housing 51. A clutch band 64 encompasses the drum 61, the free ends of the band being secured pivotally through the couplings 65 and pins 66 to one end of the spaced rocker arms 67. The rocker arms are mounted pivotally intermediate their ends upon the spaced pivot pins 68 secured to the rotary disc.

A cam arm 69 is mounted pivotally at one end upon pin 70 secured to the rotary disc 48. This pivoted end of arm 69 is formed with a laterally projecting cam 71 of oval shape. The cam is

disposed between the spaced rocker arms for abutment with the latter adjacent the ends opposite the couplings 65.

The end of cam arm 69 opposite the cam 71 is connected pivotally through the adjustable link 72 to the plunger 73 of the solenoid 74. The solenoid is secured to the rotary disc 48 by spaced bolts 75. A coil spring 76 surrounds the pivoted end of cam arm 69 adjacent the cam 71 and is secured adjustably at its opposite ends in slots formed in the rotary disc 48 and the arm 69, respectively, as best shown in Figure 5. This coil spring functions upon deenergization of the solenoid 74 to withdraw the plunger 73 and release the clutch, as fully explained hereinafter.

A collector ring 77 of electrically non-conducting material is received about the shaft 42 through its enlarged central opening 78. The ring is secured to the rotary disc 49 by the circumferentially spaced bolts 79. The rotary disc and collector ring are held in spaced relation by the spacer tubes 80 mounted upon the bolts 79 intermediate the ends thereof. By the foregoing construction the collector ring is caused to rotate with the rotary disc 48.

Mounted upon the non-conducting collector ring is a pair of electrically conducting contact rings 81 and 82 arranged in spaced concentric relation. A terminal screw 83 is secured to each contact ring and extends through the collector ring 77. The terminal screws function to connect the conductors 84 and 85 leading from the clutch solenoid 74 to the respective contact rings 81 and 82.

Sliding electrical contact with the contact rings is made by such means as the conventional spring-loaded carbon brushes 86 mounted within the central hollow portion of the standard 39. The electrical conductor wires 87 and 88 connecting the brushes extend laterally through the standard 39 to a terminal block 89 mounted upon the case. The central open portion of the standard is sealed by the removable plate 90.

Referring now particularly to Figures 4 and 5 of the drawings, the upper half of the fixed disc 45 is provided with concentric arcuate slots 91 extending transversely thereof and curved about the axial center of shaft 42. The circumferential slots are preferably interrupted at spaced intervals to form structural ribs 92 which function to reinforce the disc 45. The ribs of adjacent concentric slots are preferably staggered radially, as shown in Figure 4, for purposes explained hereinafter.

A plurality of micro switches 93, 94, 95, 96 and 97 are supported by their lateral, threaded extensions 98 in the arcuate slots 91 of disc 45. These lateral extensions extend slidably through the slots and are secured releasably by the lock nuts 99. In this manner each micro switch may be secured in any desired position within the circumferential limits of the arcuate slots. Where a rib 92 prevents the proper mounting of a micro switch in one circumferential slot, the adjacent concentric slot is available. The spring-loaded contact buttons 100 of the micro switches project outwardly from the ends of the lateral extensions 98.

The terminal connectors 101 of the micro switches are connected by conductor wires (not shown) to the terminal block 89 mounted upon the case.

The rotary disc 48 is also provided with concentric arcuate slots 102 curved about the axial center of shaft 42 and preferably curved upon the same radii as the respective slots 91 in the fixed disc 45. The length of the slots 102 need be only a fraction of the length of the slots 91, however. Mounted adjustably in the arcuate slots 102 are the finger cams 103 and 104. The connecting end of each of these cams comprises a cylindrical end portion, having a diameter substantially equal to the width of the arcuate slot 102, and an intermediate shoulder portion 105. The cylindrical end is received slidably in the slot with the shoulder 105 abutting against the face of the rotary disc 48. A bolt 106 (Figure 3) is then threaded into the cylindrical end to abut against the disc face opposite the shoulder 105. The cams 103 and 104 are of substantial width and are each curved about the axial center of the shaft 42, as best shown in Figure 6.

The finger cams are arranged to engage and depress each of the contact buttons 100 of the several micro switches as the rotary disc 48 is caused to rotate, as explained in detail hereinafter. Thus, the finger cam 103 actuates micro switches secured in the outer circumferential arcuate slots, while the inner finger cam 104 actuates micro switches secured in the inner circumferential slots. In the arrangement illustrated in the drawings and best shown in Figure 4, the finger cam 103 actuates the micro switches 93, 94, 95 and 97 while finger cam 104 actuates micro switch 96.

It is to be noted here that micro switch 93 is arranged in such manner that its contact button 100 is depressed by finger cam 103 when the rotary disc 48 is at its rest position, i. e. when the bar 58 is in abutment with the bumper 60. This micro switch is hereinafter referred to as the safety micro switch. The safety micro switch is closed when engaged by the finger cam 103, whereas the remaining micro switches are opened when engaged by the finger cams.

It is to be noted further that the number of micro switches to be mounted in the arcuate slots 91 is dependent upon the number of different sizes of boards to be cut, as explained in detail hereinafter.

Referring now to Figure 1 of the drawings, the freely rotating shaft 42 projects at one end through the case 30 mounted upon the carriage frame 18, as explained hereinbefore. Secured to this projecting end of shaft 42 is a sprocket 107 which is coupled through chain 108 to sprocket 109 mounted upon the reduced end of drive shaft 23 of the set shaft air motor 19. By virtue of the positive coupling between the knees 13 and the set shaft 14, as afforded by the lead screws 15, there is established a definite relationship between the linear distance through which the knees travel per revolution of the set shaft. Accordingly, since the set shaft is coupled through the drive shaft of the air motor 19 to the shaft of the setworks mechanism, there is established a definite relationship between the linear movement of the knees per degree of rotation of the setworks shaft 42. Thus, for example, with the safety micro switch 93 in the normal rest position shown in Figure 4, the angles formed from the axial center of shaft 42 between the safety micro switch 93 and the respective micro switches 94, 95, 96 and 97 represent forward movements of the knees of 3, 4, 5 and 6 inches, respectively.

Mounted upon the moving carriage is a reference dial 110. This dial is mounted upon shaft 111 journaled for rotation in bearing 112 secured to an upright support of the carriage. A sprocket

wheel 113 secured to shaft 111 is connected through chain 114 to sprocket wheel 115 mounted upon the set shaft 14. An index pointer 116 is mounted upon the upright support for bearing 112 for registry with the dial 110. By proper selection of sprocket wheels 113 and 115, the indicated graduation on the reference dial under the index pointer identifies the number of inches separating the knees 13 and the plane of the saw blade 25.

In Figure 1 there is shown a forward limit switch 117 and a reverse limit switch 118 mounted upon elements of the carriage framework adjacent the right-hand knee 13. These switches are arranged in the circuits of the drive motor controls, as shown in Figure 8. A finger 119 projecting laterally from the knee is arranged to contact the forward and reverse limit switches at the extreme opposite limits of travel of the knees. Thus, upon contact of the finger 119 with either switch, the circuit to the drive motor 19 is opened and rotation of the set shaft 14 is stopped. In this manner the linear travel of the knees is restricted to the length of the head blocks 12 or to any shorter distance desired.

The terminal block 89 mounted upon the case 30 functions as a detachable coupling for the electrical conductors extending between the mechanism contained within said case and the mechanism mounted externally thereof. These conductors, omitted in Figure 1 to avoid encumbering the view but illustrated diagrammatically in Figure 8, lead from the case to the setworks control panel 120.

The control panel 120 is located conveniently between the log deck and the saw blade 25, and is preferably arranged slightly forward of but between the spaced levers 121 by which the operator controls the movements of the log deck and carriage assembly from his position in seat 122. The setworks control panel 120, the levers 121 and seat 122 may be shielded, if desired, by the protective walls indicated by the dotted lines 123 to insure the operator against injury from flying particles.

Mounted in the top of the control panel 120 are a plurality of electrical push button switches by which the operation of the setworks mechanism is controlled by the operator. These push buttons are shown in Figures 1 and 8 as being seven in number to accommodate the cutting of logs into the four different dimensions of boards exemplified hereinbefore. The function and operation of the push button switches are described in detail hereinafter.

Referring now to Figure 8 of the drawings, there is shown a diagram of the preferred electrical system by which the several elements of the setworks are interconnected. In this modification the set shaft motor 19 is shown to be an air motor operated by the forward solenoid 124, the reverse solenoid 125 and the exhaust solenoid 126. The forward solenoid is connected to the 110 volt supply lines 127 and 128 through the normally open breaker contacts 129 and 130, respectively, of the forward relay coil 131. The reverse solenoid 125 is connected to the 110 volt supply lines 127 and 128 through the normally open breaker contacts 132 and 133, respectively, of the reverse relay coil 134. The exhaust solenoid 126 is connected to the supply line 127 through either of the normally open breaker contacts 129 and 132 of the respective forward and reverse relay coils 131 and 134, and to the supply line 128 through either of the breaker contacts 135 and 136 of said respective relay coils 131 and 134. Thus, it is apparent that the exhaust solenoid is actuated simultaneously with either the forward or reverse solenoids.

The forward relay coil 131 is connected from the 110 volt supply line 127 through the forward knee limit switch 117, through the normally open forward push button switch 137 and the normally closed stop push button switch 138 to the 110 volt supply line 128. In similar manner, the reverse relay coil 134 is connected from supply line 127 through the reverse knee limit switch 118, through the normally open reverse push button switch 139 and the normally closed stop push button switch 138 to supply line 128. In accordance with well-known practice, the breaker contacts of the forward and reverse relay coils are interlocked mechanically, as indicated by the broken line 140, to prevent their simultaneous actuation.

A safety relay coil 141 is energized by a circuit completed from the 110 volt supply line 127, through the said coil 141, through line 142 to the normally closed contact positions of the control push button switches 143, 144, 145 and 146, through line 147 and the safety micro switch 93 when closed by finger cam 103 in the normal rest position of the rotary disc 48, and thence through the normally closed stop push button switch 138 to supply line 128. It is to be observed that, in the normal rest position of the setworks, the above circuit is complete and the safety relay coil 141 is energized. It is evident, however, that when the rotary disc 48 moves the finger cam 103 away from the safety micro switch 93, the circuit of the safety relay coil 141 is opened.

Upon energization of the safety relay coil 141, the holding contact 148 is closed to complete a circuit arranged in parallel with the control push button switches 143 to 146, inclusive, by line 149. In this manner any of the latter switches may thereafter be depressed without opening the circuit of the safety relay coil 141.

Energization of the safety relay coil also closes the contact 150 which completes the circuit of any one of the said control push button switches when in the depressed position. For example: The circuit of the depressed control push button switch 143 is completed from supply line 128 through the stop switch 138, through the normally closed interlock contact 151, through the closed safety contact 150 and depressed push button switch 143, and thence through the control relay coil 152 to supply line 127.

Upon energization of the control coil 152, the normally open contacts 153, 154 and 155 are caused to close. The closing of holding contact 153 completes a circuit through the normally closed micro switch 94 arranged in parallel with the series combination of the interlock contact 151, the safety contact 150 and control push button switch 143. The closing of contact 154 completes a circuit from supply line 127 through the forward relay coil 131 and forward knee limit switch 117 to supply line 128. The closing of contact 155 completes a circuit through the clutch solenoid 74 arranged in parallel with the series combination of the micro switch 94 and control coil 152. Thus, the depressing of control push button 143 causes energization of the control relay coil 152 which closes the contacts 153, 154 and 155 to energize the forward relay coil 131 and the clutch solenoid 74.

In the manner of the foregoing description, depressing control push button 144 causes activa-

tion of control relay coil 156 which closes contacts 157, 158 and 159 to energize the forward relay coil 131 and clutch solenoid 74; depressing control push button 145 energizes control relay coil 160 which closes contacts 161, 162 and 163 to energize the forward relay coil 131 and the clutch solenoid 74; and depressing control push button 146 energizes control relay coil 164 which closes contacts 165, 166 and 167 to energize the forward relay coil 131 and clutch solenoid 74.

It is to be observed here that the closing of either the forward push button switch 137 or the reverse push button switch 139 does not activate the control relay coils nor the clutch solenoid 74. In addition, it is to be noted that the closing of the reverse push button switch 139 completes a circuit from supply line 127 through the interlock relay coil 168, through the reverse knee limit switch 118 and the depressed reverse push button switch 139, thence through the normally closed stop push button switch 138 to supply line 128. Thus, when the reverse push button switch is closed to energize the reverse relay coil 134, the interlock relay coil 168 is also energized and the interlock contact 151 is opened to break the circuits of all of the control push buttons for their depressed positions. This arrangement insures against the energization of the clutch solenoid when the knees 13 are being retracted, and thereby prevents possible damage to the setworks mechanism.

As explained hereinbefore, the closing of the holding contacts 153, 157, 161 and 165 completes circuits through the respective micro switches 94, 95, 96 and 97 which shunt the respective control push button switches 143, 144, 145 and 146. Thus, the normally closed micro switches maintain their respective control relay coils energized after the control push button has been released. It is evident, therefore, that the control relay coils will become deenergized when their respective micro switches are opened upon contact of the finger cams 103 and 104.

The operation of the setworks described hereinbefore is as follows: Let it be assumed, for purposes of this description, that the operator contemplates the cutting of logs into the various dimensions of 2⅔, 3⅔, 4⅔ and 5⅔ inches, and that the width of the saw blade 25 is one-third inch. Since the width of the saw kerf must be accounted for in each cut, the respective forward movements of the knees necessary to produce the above desired cuts are 3, 4, 5 and 6 inches. Assume further, therefore, that the mirco switches 94, 95, 96 and 97 have been secured in the arcuate slots 91 of the fixed supporting disc 45 in such manner that their respective angular displacements with respect to the safety micro switch 93 represent forward linear movements of the knees on the head blocks of 3, 4, 5 and 6 inches.

Assume further that the knees are presently disposed closely adjacent the plane of the saw blade and therefore must be retracted preparatory to the deposit of a log upon the head blocks. By visual inspection the operator estimates the diameter of the log to be about three feet. Accordingly, since the knees are to be retracted, the operator, stationed at the seat 122, depresses the reverse push button 139 mounted upon the control panel 120.

The closure of the reverse push button switch completes the circuit of the reverse relay coil 134 which thereupon becomes energized to close the breaker contacts 132, 133 and 136. The 110 volt circuits of the respective reverse and exhaust solenoids 125 and 126 are thereby energized and the air motor 19 is operated to rotate the set shaft 14 in the direction for retracting the knees. The setworks shaft 42 rotates with the set shaft, as previously explained.

Simultaneously with the foregoing energization of the reverse relay coil 134, the closure of the reverse push button switch 139 closed the circuit of the interlock relay coil 168. The interlock contact 151 is thereby opened to prevent accidental energization of the clutch solenoid 74. It is apparent that should the clutch band 64 become engaged with the clutch drum 61 while the latter is rotating in the reverse direction, serious damage to the setworks mechanism might be sustained.

While maintaining the reverse push button switch closed, the operator watches the reference dial 110. Then, as the numerical value of thirty-six inches on the said dial registers with the index pointer 116, the operator releases the reverse push button. The reverse relay coil 134 is thereby deenergized, the breaker contacts 132, 133 and 136 open the 110 volt supply lines of the respective reverse and exhaust solenoids 125 and 126, and the air motor 19 is stopped. The knees have thus been retracted to a position thirty-six inches from the plane of the saw blade, as desired.

With the carriage arranged in position adjacent the log deck, the operator now manipulates the levers 121 to deposit the log upon the head blocks and to secure it in positive abutment with the knees, in conventional manner.

Let it now be assumed that it is necessary to draw the log forwardly i. e. toward the plane of the saw blade in order to make the initial slab cut. Accordingly, the operator depresses the forward push button 137. This energizes the forward relay coil 131 which closes the breaker contacts 129, 130 and 135 in the 110 volt supply lines of the respective forward and exhaust solenoids 124 and 126 of the air motor 19. The set shaft 14 rotates and draws the knees and log forwardly. When sufficient thickness of log has been drawn across the plane of the saw blade to make the desired slab cut, the operator releases the forward push button 137. The air motor is thereby deactivated, the rotation of the set shaft is stopped and the forward movement of the log is halted.

By manipulation of the levers 121 the operator moves the carriage forwardly upon the rails 7, whereby the saw blade engages the log and makes the desired slab cut. The operator now manipulates the levers 121 to draw the carriage rearwardly to its initial starting position. Assume the the operator repeats the foregoing procedure after turning the log through successive 90° stages to remove the four quadrant slab cuts and produce a square cant, the forward edge of which lies on the plane of the saw blade. Assume further that the value of 28 inches on the reference dial 110 registers with the index pointer 116. This indicates to the operator that the thickness of the cant is 28 inches.

Let it now be assumed that the operator wishes to cut from the square cant a board having a thickness of 4⅔ inches. Since, in this example, the width of the saw blade is one-third inch, the total forward movement of the knees required for producing this board is five inches. This dimen-

sion corresponds to the angular position of micro switch 96 relative to the safety micro switch 93. Since micro switch 96 is arranged in the circuit of the control push button switch 145, the operator will depress the latter for moving the knees 13 forwardly a distance of five inches.

Prior to depressing the control push button 145, the electrical system is in the condition shown in Figure 8. In this condition the safety micro switch 93 is closed by virtue of its contact with the finger cam 103, the rotary disc 48 being at its normal rest position with bar 58 in abutment with the stop 60. With the safety micro switch 93 closed, the safety relay coil 141 is energized and the contacts 148 and 150 are closed.

The operator now depresses the control push button 145 and thereby completes the circuit of the control relay coil 160, as explained hereinbefore. Upon energization of the control relay coil 160 the contacts 161, 162 and 163 are closed simultaneously.

The closure of contact 163 completes a circuit from supply line 128 through the stop push button switch 138 to collector ring 82, through the clutch solenoid 74 to collector ring 81, and thence through contact 163 to supply line 127. The clutch solenoid is thereby energized and the solenoid plunger 73 is drawn downwardly. Cam arm 69 is thus caused to swing downwardly and pivot the cam 71 in a counterclockwise direction. The cam thereby forces the rocker arms 67 apart at their upper ends and draws the lower ends together. The clutch band 64 is thus caused to be tightened upon the clutch drum 61.

Simultaneously with the activation of the brake solenoid 74 the closure of contact 162 completes the circuit of the forward relay coil 131, as previously explained. The breaker contacts 129, 130 and 135 are thereby closed and the air motor 19 is activated to rotate the set shaft in the direction for moving the knees forwardly toward the plane of the saw blade.

By virtue of the positive coupling between the set shaft 14 and the setworks shaft 42 through the drive shaft 23 of the air motor, the setworks shaft rotates simultaneously with the set shaft. Thus, since the clutch band 64 has been tightened upon the clutch drum 61, the rotary disc 48 is caused to rotate simultaneously with the setworks shaft 42 and set shaft 14.

As the knees progress forwardly, the rotary disc 48 turns in a clockwise direction, as viewed in Figures 3 and 7 of the drawings. The finger cam 103 mounted upon the rotary disc is thereby rotated out of engagement with the spring-loaded contact 100 of the safety micro switch 93, whereupon the latter opens and breaks the circuit of the safety relay coil 141. Deenergization of the safety relay coil causes the contacts 148 and 150 to open. The opening of contact 150 breaks the circuits of the control push button switches for their depressed positions and thereby renders the latter incapable of energizing their respective cooperating control relay coils. This arrangement prevents the activation of the control relay coils by the control push buttons until the operating cycle presently in progress is completed.

The circuit of the control relay coil 160 is now completed only through the micro switch 96 and the closed contact 161. The rotary disc 48 continues to rotate the finger cam 104 toward the micro switch 96. Although finger cam 103 successively engages and depresses micro switches 94 and 95 during this rotation of disc 48, the circuits of their cooperating relay coils 152 and 156, respectively, had not previously been energized and therefore no action results.

When finger cam 104 rotates into engagement with the spring-loaded contact of micro switch 96, the set shaft has caused the knees to be moved forward upon the head blocks a distance of five inches. Upon engagement of the finger cam 104 with micro switch 96 the latter is opened and the corresponding control relay coil 160 is deenergized. Contacts 161, 162 and 163 thereupon open immediately to deenergize the forward relay coil 131 and clutch solenoid 74 as explained hereinbefore.

The deenergization of the forward relay coil 131 causes the breaker contacts to open and deactivate the respective forward and exhaust solenoids 124 and 126 of air motor 19. The closing of the motor exhaust port functions to brake the motor to a rapid stop, as is well-known in the art. The rotation of the set shaft 14, the setworks shaft 42 and the rotary disc 48 is thereby halted.

Simultaneously with the deenergization of the forward relay coil 131, the clutch solenoid 74 is also deenergized. It is to be noted here that during the counterclockwise rotation of the cam 71 in tightening the clutch band 64 about the drum 61, as described hereinbefore, the coil spring 76 was also tightened. Accordingly, upon deactivation of the solenoid the coil spring 76 tends to return to a more relaxed position. Thus, the coil spring causes the cam arm 69 to be rotated in a clockwise direction about pin 70. The solenoid plunger 73 is thereby retracted upwardly from the solenoid and the cam 71 returns to its normal state to release the clutch band from engagement with the clutch drum.

Referring particularly to Figure 7 of the drawings, it is to be noted that, during the foregoing clockwise rotation of the disc 48 which moved finger cam 104 into engagement with micro switch 96, the spiral spring 54 was tightened. Accordingly, when the clutch solenoid 74 becomes deenergized and the clutch band is disengaged from the clutch drum, the spring 54 is free to return from its tightened state to a more relaxed condition. In returning to this more relaxed position, the spring causes the disc 48 to be rotated in a counterclockwise direction until the bar 58 comes into abutment with the stop 60. The tension of spring 54 may be adjusted within rather wide limits by loosening the set screw 53 and rotating the housing 51 in the proper direction until the desired tension is obtained. The set screw is then tightened into engagement with the hub 46 of the fixed disc 45.

The rotary disc has thus been returned to its normal rest position, and finger cam 103 has returned to engage and close the safety micro switch 93. The operating cycle of the setworks has now been completed, with the knees having been moved forwardly toward the plane of the saw blade a distance of five inches.

The operator observes that the numerical value on reference dial 119 now registering with the index pointer 116 is 23 inches. Since the prior reading was 28 inches, the operator is assured that the desired setting has been properly made.

The operator now manipulates the levers 121 to move the carriage forward over the rails 7 and thus to cut the board from the cant, after which the carriage is returned in the manner previously explained.

In the event the operator desires to cut several more boards of 4⅔ inch thickness, he merely

depresses the same control push button 145 to repeat the cycle described hereinbefore. On the other hand, if it is desired to cut boards of either 2⅔, 3⅔, or 5⅔ inch thicknesses, the operator merely depresses the appropriate control push button 143, 144, or 146, respectively. The operating cycle for any of these is the same as the cycle previously described.

It is to be noted here that should the operator maintain the reverse push button 139 depressed for a time sufficient to draw the knees rearwardly to their extreme limit, the finger 119 carried by the right-hand knee will engage and open the reverse limit switch 118. The opening of this switch breaks the circuit of the reverse relay coil 134 and thereby results in the deactivation of the air motor 19. Thus, the rotation of the set shaft ceases and the rearward travel of the knees is halted. In similar manner, excessive forward travel of the knees by depression of the forward push button 137 or any of the control push buttons is restricted by the opening of the forward knee limit switch 117.

From the foregoing detailed description of the construction and operation of the setworks illustrated, it is believed apparent that those skilled in the art will recognize the many advantages of the present invention. When employed as setworks in sawmill operation the required settings of the knees are made rapidly with precision and with the facility of push button control. Lumber production is substantially increased while the requirement for operating personnel is reduced to a single sawyer. Complete operating safety is afforded by removal of the push button control panel to a position remote from the carriage.

It will be further apparent to those skilled in the art that the present invention is readily adaptable for use with other than sawmill apparatus. In general, the present invention is capable of controlling the angular displacement or rotation of any shaft or other device driven by an electrically controllable motor. Thus, for example, the reference dial may be graduated in degrees to designate the angular rotation of a rotary shaft.

Various changes in the structural details illustrated and described hereinbefore may be made without departing from the scope and spirit of this invention. For example, it is evident that the positions of the micro switches and their actuating finger cams upon the fixed support 45 and rotatable disc 48, respectively, may be reversed, i. e. the switches may be mounted upon the rotary disc 48 and the cams mounted upon the fixed support. The types and relative positions of other cooperating elements may also be changed in accordance with recognized practices.

It is to be noted that a plurality of micro switches are illustrated in the drawings and have been described hereinbefore as each providing for a different angular displacement of the set shaft and, hence, a different forward setting of the knees. Those skilled in the art will recognize that but one micro switch need be provided and that it may be adjusted circumferentially with respect to the rest position of the finger cam to establish different angular displacements. The structure illustrated is preferred, however, because it provides a number of different settings each of which is immediately available for use merely by depressing the proper control push button switch.

Although the setworks case 30 and the mechanism housed therein is shown in Figure 1 as being mounted upon the carriage adjacent the drive motor 19, it is to be understood that the unit may be removed to a position remote from the carriage as, for example, adjacent the control panel 120. In such cases, coupling between the drive shaft 23 of motor 19 and the control shaft 42 of the setworks may be made by means of Selsyn motors or other equivalent servo-type system in the manner described in detail in our copending application, Serial No. 210,581 filed concurrently herewith and entitled Remote Control Setworks. This type of arrangement is illustrated in Figure 9 wherein the drive shaft 23 of motor 19 is connected by flexible coupling 170 to the drive shaft 171 of the master Selsyn motor 172. Wires 173 interconnect the master Selsyn and a slave Selsyn 174 whose drive shaft 175 is connected through the flexible coupling 176 to the shaft 42 of the setworks control mechanism contained in the case 30.

In view of the foregoing and other apparent changes, it is to be understood that the detailed description set forth hereinbefore is merely illustrative and is not to be considered in a limiting sense.

Having thus described our invention and the manner in which the same may be used, what we claim as new and desire to secure by Letters Patent is:

1. A device for controlling the angular displacement of a rotary shaft powered by an electrically actuated motor, said device comprising, in combination with an electrical supply for actuating the motor; a control shaft adapted to be coupled to the rotary shaft for simultaneous rotation therewith, a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the control shaft, first switch means mounted upon one of the supports and arranged in the circuit of the motor and coupling actuating means, switch-actuating means mounted upon the other support in angular displacement with the switch means when the rotatable support is in rest position, the switch and switch-actuating means being disposed for mutual contact upon a predetermined rotation of the rotatable support, control switch means in the circuit of the motor and coupling actuating means for activating the motor and coupling means simultaneously to rotate the rotary shaft and the rotatable support, the first switch means functioning upon engagement of the switch-actuating means to deactivate the motor and coupling means, whereby to stop the rotation of the rotary shaft after the latter has rotated through the angle selected by the control switch means, and means independent of the motor for returning the rotatable support to its rest position after rotation.

2. A device for controlling the angular displacement of a rotary shaft powered by an electrically actuated motor, said device comprising, in combination with an electrical supply for actuating the motor; a control shaft adapted to be coupled to the rotary shaft for simultaneous rotation therewith, a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the control shaft, a plurality of first switch means mounted upon one of the supports and each arranged in the circuit of the motor and coupling actuating means, switch-ac-

tuating means mounted upon the other support, the angular displacement between the switch-actuating means and each first switch means when the rotatable support is in rest position being proportionate to a corresponding angular displacement of the rotary shaft, a plurality of control switch means each arranged in the circuit of the motor and coupling actuating means and one of the first switch means for activating the motor and coupling means simultaneously to rotate the rotary shaft and the rotatable support, the control switch means being adapted to be positioned remotely from the rotary shaft, each first switch means functioning upon engagement of the switch-actuating means to deactivate the motor and coupling means, whereby to stop the rotation of the rotary shaft after the latter has rotated through the angle selected by the corresponding control switch means, and means independent of the motor for returning the rotatable support to its rest position after rotation.

3. A device for controlling the angular displacement of a rotary shaft powered by an electrically actuated motor, said device comprising, in combination with an electrical supply for actuating the motor; a control shaft adapted to be coupled to the rotary shaft for rotation therewith, a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the control shaft, circuit breaker means detachably connecting the motor to the electrical supply, electrically actuated selector means in the circuit of the breaker and coupling actuating means, first switch means mounted upon one of the supports and arranged in the circuit of the selector - actuating means, switch - actuating means mounted upon the other support in angular displacement with the first switch means when the rotatable support is in rest position, control switch means in the circuit of the selector-actuating means for activating the motor and coupling means simultaneously to rotate the rotary shaft and the rotatable support, the first switch means functioning upon engagement of the switch-actuating means to open the circuit of the selector-actuating means and to deactivate the motor and coupling means, whereby to stop the rotation of the rotary shaft after the latter has rotated through the angle selected by the control switch means, and means for returning the rotatable support to its rest position after rotation.

4. A device for controlling the angular displacement of a rotary shaft powered by an electrically actuated motor, said device comprising, in combination with an electrical supply for actuating the motor; a control shaft adapted to be coupled to the rotary shaft for rotation therewith, a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the control shaft, circuit breaker means detachably connecting the motor to the electrical supply, a plurality of electrically actuated selector means in the circuit of the breaker and coupling actuating means, a plurality of first switch means mounted upon one of the supports and each arranged in the circuit of one of the selector-actuating means, switch-actuating means mounted upon the other support in angular displacement with each first switch means when the rotatable support is in rest position, control switch means in the circuit of each selector-actuating means for activating the motor and coupling means simultaneously to rotate the rotary shaft and the rotatable support, each first switch means functioning upon engagement of the switch-actuating means to open the circuit of the corresponding selector-actuating means and to deactivate the motor and coupling means, whereby to stop the rotation of the rotary shaft after the latter has rotated through the angle selected by the control switch means, and means for returning the rotatable support to its rest position after rotation.

5. A device for controlling the angular displacement of a rotary shaft powered by an electrically actuated reversible motor, said device comprising, in combination with an electrical supply for actuating the motor; a control shaft adapted to be coupled to the rotary shaft for rotation therewith, a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the control shaft, circuit breaker means detachably connecting the motor to the electrical supply for forward and reverse rotation, electrically actuated selector means in the circuit of the forward breaker and coupling actuating means, first switch means mounted upon one of the supports and arranged in the circuit of the selector-actuating means, switch-actuating means mounted upon the other support in angular displacement with the switch means when the rotatable support is in rest position, control switch means in the circuit of the selector-actuating means for activating the motor and coupling means simultaneously to rotate the rotary shaft and the rotatable support, the first switch means functioning upon engagement of the switch-actuating means to open the circuit of the selector-actuating means and to deactivate the motor and coupling means, whereby to stop the rotation of the rotary shaft after the latter has rotated through the angle selected by the control switch means, and means for returning the rotatable support to its rest position after rotation.

6. A device for controlling the angular displacement of a rotary shaft powered by an electrically actuated reversible motor, said device comprising, in combination with an electrical supply for actuating the motor; a control shaft adapted to be coupled to the rotary shaft for rotation therewith, a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the control shaft, circuit breaker means detachably connecting the motor to the electrical supply for forward and reverse rotation, a plurality of electrically actuated selector means in the circuit of the forward breaker and coupling actuating means, a plurality of first switch means mounted upon one of the supports and each arranged in the circuit of one of the selector-actuating means, switch-actuating means mounted upon the other support, control switch means in the circuit of each selector-actuating means for activating the motor and coupling means simultaneously to rotate the rotary shaft and the rotatable support, each first switch means functioning upon engagement of the switch-actuating means to open the circuit

of the selector-actuating means and to deactivate the motor and coupling means, whereby to stop the rotation of the rotary shaft after the latter has rotated through the angle selected by the corresponding control switch means, and means for returning the rotatable support to its rest position after rotation.

7. A sawmill setworks comprising, in combination with a saw, a carriage having knees mounted slidably thereon and driven by a set shaft powered by an electrically actuated motor, and an electrical supply for actuating the motor; a control shaft adapted to be coupled to the set shaft for simultaneous rotation therewith, a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the control shaft, first switch means mounted upon one of the supports and arranged in the circuit of the motor and coupling actuating means, switch-actuating means mounted upon the other support, the angular displacement between the switch-actuating means and the switch means when the rotatable support is in rest position being proportionate to the linear movement of the knees, control switch means in the circuit of the motor and coupling actuating means for activating the motor and coupling means simultaneously to rotate the set shaft and the rotatable support, the first switch means functioning upon engagement of the switch-actuating means to deactivate the motor and coupling means, whereby to stop the rotation of the set shaft after the latter has rotated through the angle selected by the control switch means, and means independent of the motor for returning the rotatable support to its rest position after rotation.

8. A sawmill setworks comprising, in combination with a set shaft powered by an electrically actuated motor, and an electrical supply for actuating the motor; a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the set shaft, a plurality of first switch means mounted upon one of the supports and arranged in the circuit of the motor and coupling actuating means, switch-actuating means mounted upon the other support in angular displacement with each switch means when the rotatable support is in rest position, a plurality of control switch means each arranged in the circuit of the motor and coupling actuating means and one of the first switch means for activating the motor and coupling means simultaneously to rotate the set shaft and the rotatable support, the control switch means being adapted to be positioned remotely from the set shaft, each first switch means functioning upon engagement of the switch-actuating means to deactivate the motor and coupling means, whereby to stop the rotation of the set shaft after the latter has rotated through the angle selected by the control switch means, and means independent of the motor for returning the rotatable support to its rest position after rotation.

9. A sawmill setworks comprising, in combination with a saw, a carriage having knees mounted slidably thereon and driven by a set shaft powered by an electrically actuated motor, and an electrical supply for actuating the motor; a control shaft adapted to be coupled to the set shaft for rotation therewith, a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the control shaft, circuit breaker means detachably connecting the motor to the electrical supply, a plurality of electrically actuated selector means in the circuit of the breaker and coupling actuating means, a plurality of first switch means mounted upon one of the supports and each arranged in the circuit of one of the selector-actuating means, switch-actuating means mounted upon the other support, the angular displacement between the switch-actuating means and each first switch means when the rotatable support is in rest position being proportionate to the linear movement of the knees, control switch means in the circuit of each selector-actuating means for activating the motor and coupling means simultaneously to rotate the set shaft and the rotatable support, each first switch means functioning upon engagement of the switch-actuating means to open the circuit of the selector-actuating means and to deactivate the motor and coupling means, whereby to stop the rotation of the set shaft after the latter has rotated through the angle selected by the control switch means, and means for returning the rotatable support to its rest position after rotation.

10. A sawmill setworks comprising, in combination with a set shaft powered by an electrically actuated reversible motor, and an electrical supply for actuating the motor; a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the set shaft, circuit breaker means detachably connecting the motor to the electrical supply for forward and reverse rotation, a plurality of electrically actuated selector means in the circuit of the forward breaker and coupling means, a plurality of first switch means mounted upon one of the supports and each arranged in the circuit of one of the selector-actuating means, switch-actuating means mounted upon the other support, control switch means in the circuit of each selector-actuating means for activating the motor and coupling means simultaneously to rotate the set shaft and the rotatable support, each first switch means functioning upon engagement of the switch-actuating means to open the circuit of the selector-actuating means and to deactivate the motor and coupling means, whereby to stop the rotation of the set shaft after the latter has rotated through the angle selected by the control switch means, and means for returning the rotatable support to its rest position after rotation.

11. A device for controlling from a remote position the angular displacement of a rotary shaft powered by an electrically actuated motor, said device comprising, in combination with an electrical supply for actuating the motor, a control shaft positioned remotely from the rotary shaft, a pair of adjacent supports, one of the supports being mounted for rotation, coupling means releasably interconnecting the rotatable support and the control shaft, first switch means mounted upon one of the supports and arranged in the circuit of the motor-actuating means, switch-actuating means mounted upon the other support, the switch and switch-actuating means being disposed for mutual contact upon a predetermined rotation of the rotatable support,

operating means connected to the coupling means for actuating the latter whereby, respectively, to interconnect the rotatable support and control shaft so that the displaced first switch and switch-actuating means will be brought into mutual contact upon actuation of the motor, and to disconnect the rotatable support and control shaft when the motor is stopped so that the first switch and switch-actuating means may be displaced in proportion to the desired angular displacement of the rotary shaft control switch means in the circuit of the motor-actuating means for activating the latter, the first switch means functioning upon engagement of the switch-actuating means to deactivate the motor, whereby to stop the rotation of the rotary shaft after the latter has rotated through the angle selected by the initially displaced switch and switch-actuating means, and electrical servo-mechanism coupling means interconnecting the remotely positioned control shaft and rotary shaft.

12. A device for controlling the angular displacement of a rotary shaft powered by an electrically actuated motor, said device comprising, in combination with an electrical supply for actuating the motor; a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the rotary shaft, first switch means mounted upon one of the supports and arranged in the circuit of the motor and coupling actuating means, switch-actuating means mounted upon the other support in angular displacement with the switch means when the rotatable support is in rest position, the switch and switch-actuating means being disposed for mutual contact upon a predetermined rotation of the rotatable support, control switch means in the circuit of the motor-actuating means and coupling-actuating means for activating the motor and coupling means simultaneously to rotate the rotary shaft and the rotatable support, the first switch means functioning upon engagement of the switch-actuating means to deactivate the motor and coupling means, whereby to stop the rotation of the rotary shaft after the latter has rotated through the angle selected by the control switch means, and means independent of the motor for returning the rotatable support to its rest position after rotation.

13. The device of claim 12 wherein at least one of the means (switch and switch-actuator) is mounted adjustably upon its respective support for adjusting the angular displacement therebetween.

14. The device of claim 12 including a dial mounted for rotation with the rotary shaft, the dial being graduated to indicate the angular displacement of said rotary shaft.

15. The device of claim 12 including safety switch means in the circuit of the control switch means and mounted for actuation by the rotatable support in such manner that said safety switch closes the circuit of the control switch means when the rotatable support is in rest position and said safety switch opens the circuit of the control switch means when the rotatable support is moved out of its rest position.

16. The device of claim 12 wherein the control switch means for operating the device is positioned remotely from the rotary shaft.

17. The device of claim 3 including safety switch means in the circuit of the control switch means and mounted for actuation by the rotatable support in such manner that said safety switch closes the circuit of the control switch means when the rotatable support is in rest position and said safety switch opens the circuit of the control switch means when the rotatable support is moved out of its rest position.

18. The setworks of claim 7 including a dial mounted for rotation with the set shaft, and a fixed index mounted for registry with the dial, the dial being graduated to indicate with reference to the index the distance between the knees and the plane of the saw.

19. The setworks of claim 7 including safety switch means in the circuit of the control switch means and mounted for actuating by the rotatable support in such manner that said safety switch closes the circuit of the control switch means when the rotatable support is in rest position and said safety switch opens the circuit of the control switch means when the rotatable support is moved out of its rest position.

20. The device of claim 7 wherein the control shaft, supports, electrically actuated coupling means and switch means are positioned remotely from the sawmill carriage and the control shaft and set shaft are interconnected for cooperative rotation by electrical servo-mechanism coupling means.

21. A sawmill setworks comprising, in combination with a set shaft powered by an electrically actuated motor, and an electrical supply for actuating the motor; a pair of supports, one of the supports being mounted for rotation and having a normal rest position, electrically actuated coupling means releasably interconnecting the rotatable support and the set shaft, first switch means mounted upon one of the supports and arranged in the circuit of the motor and coupling actuating means, switch actuating means mounted upon the other support, the angular displacement between the switch-actuating means and the first switch means when the rotatable support is in rest position being proportionate to the angular displacement through which the set shaft is to be rotated, control switch means in the circuit of the motor and coupling actuating means for activating the motor and coupling means simultaneously to rotate the set shaft and the rotatable support, the first switch means functioning upon engagement of the switch-actuating means to deactivate the motor and coupling means, whereby to stop the rotation of the set shaft after the latter has rotated through the angle selected by the control switch means, and means independent of the motor for returning the rotatable support to its rest position after rotation.

22. The setworks of claim 21 wherein the control switch means for operating the setworks is positioned remotely from the sawmill carriage.

23. A device for controlling the angular displacement of the set shaft of a sawmill carriage assembly from a position remote from said carriage, wherein said set shaft is powered by an electrically actuated motor; said device comprising a control shaft positioned remotely from the said carriage, a pair of adjacent supports, one of the supports being mounted for rotation, coupling means releasably interconnecting the rotatable support and the control shaft, first switch means mounted upon one of the supports and arranged in the circuit of the motor-actuating means, switch-actuating means mounted upon the other support, the first switch and switch-actuating means being disposed for mutual con-

tact upon a predetermined rotation of the rotatable support, operating means connected to the coupling means for actuating the latter whereby, respectively, to interconnect the rotatable support and control shaft so that the displaced first switch and switch-actuating means will be brought into mutual contact upon actuation of the motor, and to disconnect the rotatable support and control shaft when the motor is stopped so that the first switch and switch-actuating means may be displaced in proportion to the desired angular displacement of the set shaft control switch means in the circuit of the motor-actuating means for activating the latter, the first switch means functioning upon engagement of the switch-actuating means to deactivate the motor, whereby to stop the rotation of the set shaft after the latter has rotated through the angle selected by the initially displaced first switch and switch-actuating means, and electrical servo-mechanism coupling means interconnecting the remotely positioned control shaft and set shaft.

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