July 18, 1939. R. A. HETZER 2,166,294

FABRIC CLEANING APPARATUS

Filed April 29, 1936 5 Sheets-Sheet 1

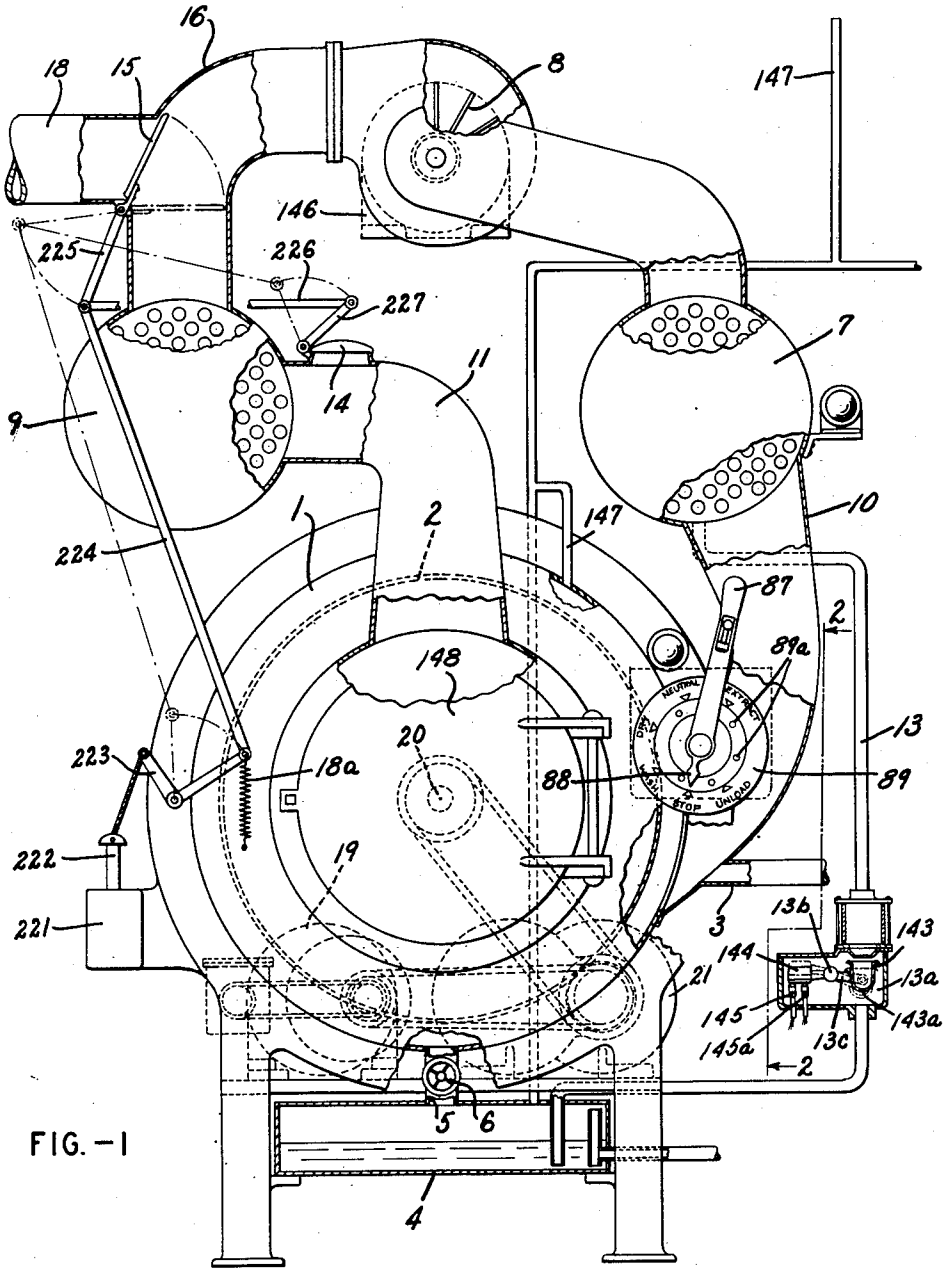

FIG. - 1

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Filed April 29, 1936 5 Sheets-Sheet 2

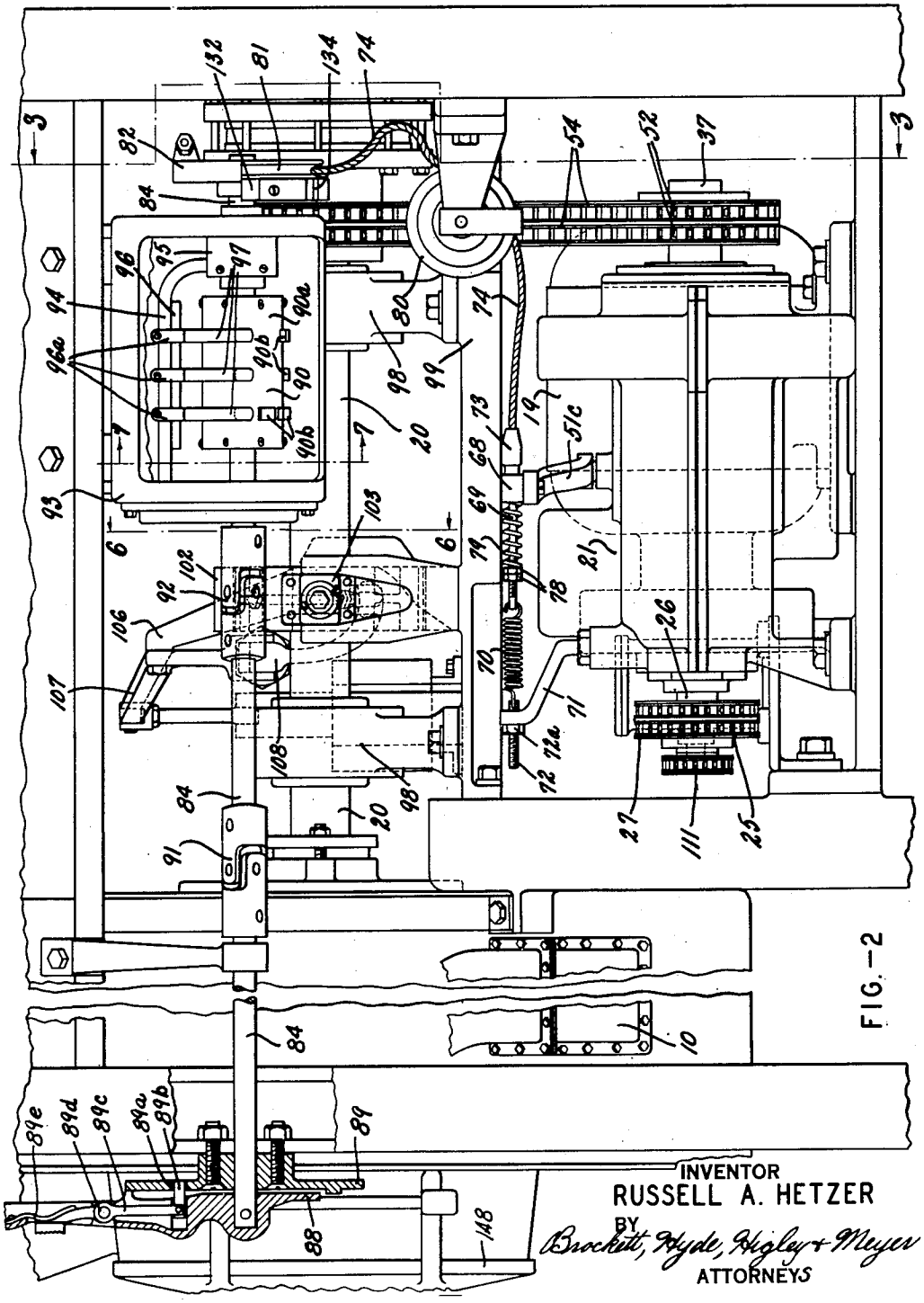

FIG. —2

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FABRIC CLEANING APPARATUS

Filed April 29, 1936 5 Sheets-Sheet 3

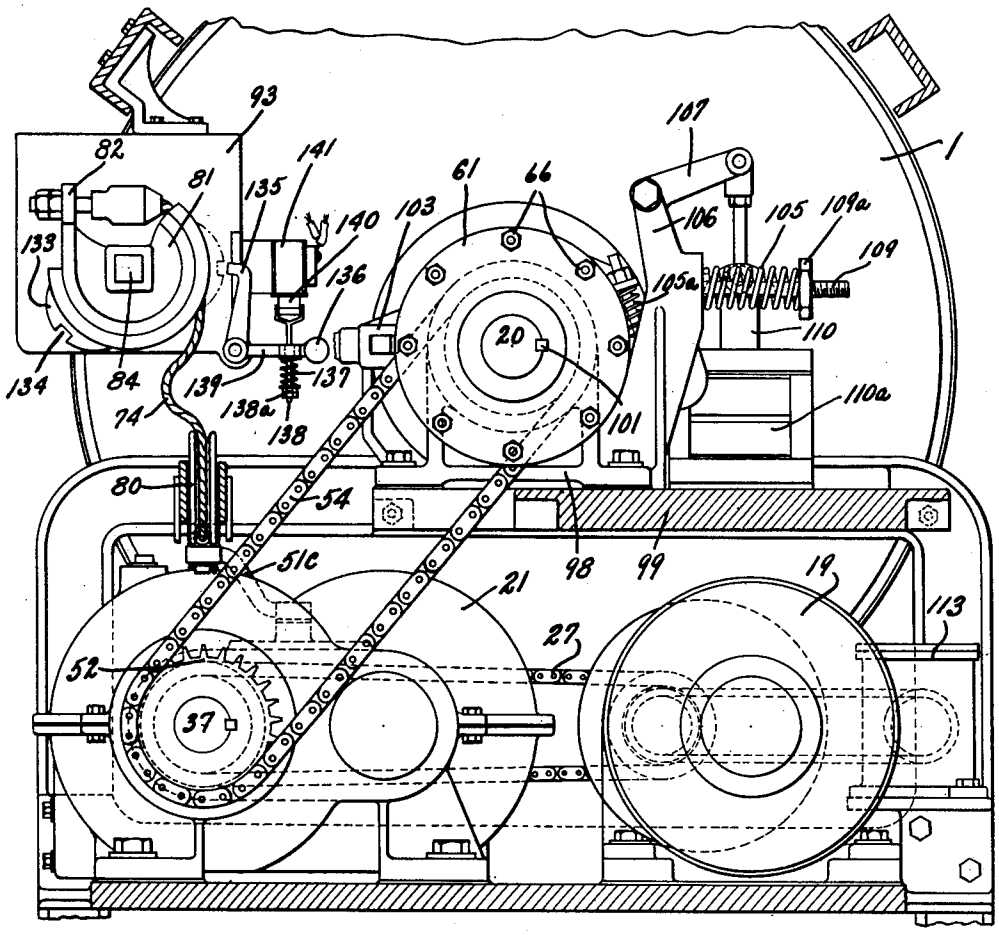

FIG.—3

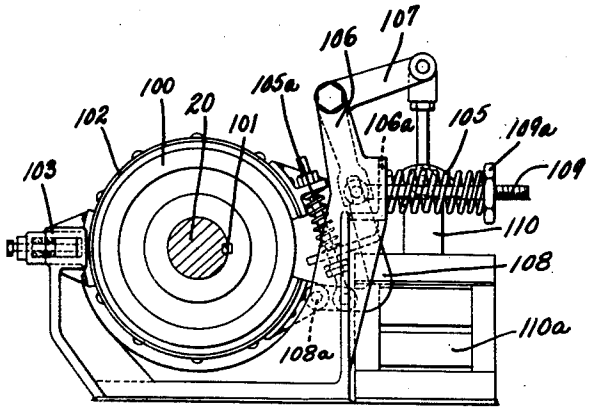

FIG.—6

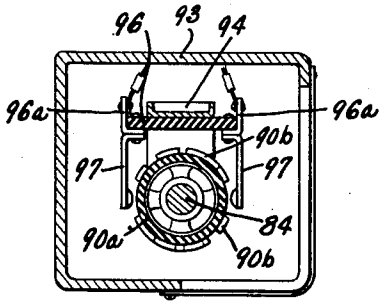

FIG.—7

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FABRIC CLEANING APPARATUS

Filed April 29, 1936 5 Sheets-Sheet 4

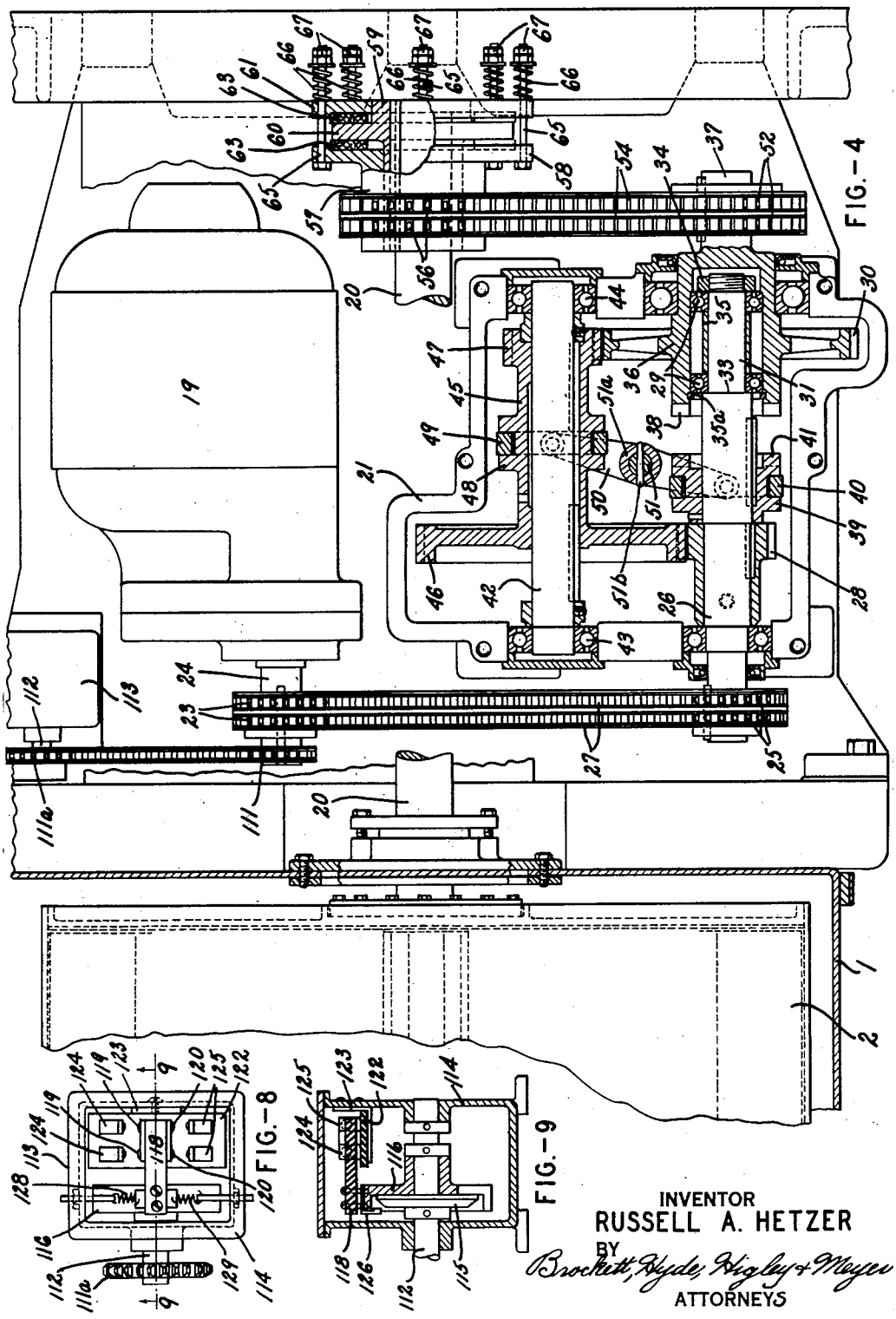

FIG.-4

FIG.-8

FIG.-9

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FABRIC CLEANING APPARATUS

Filed April 29, 1936 5 Sheets-Sheet 5

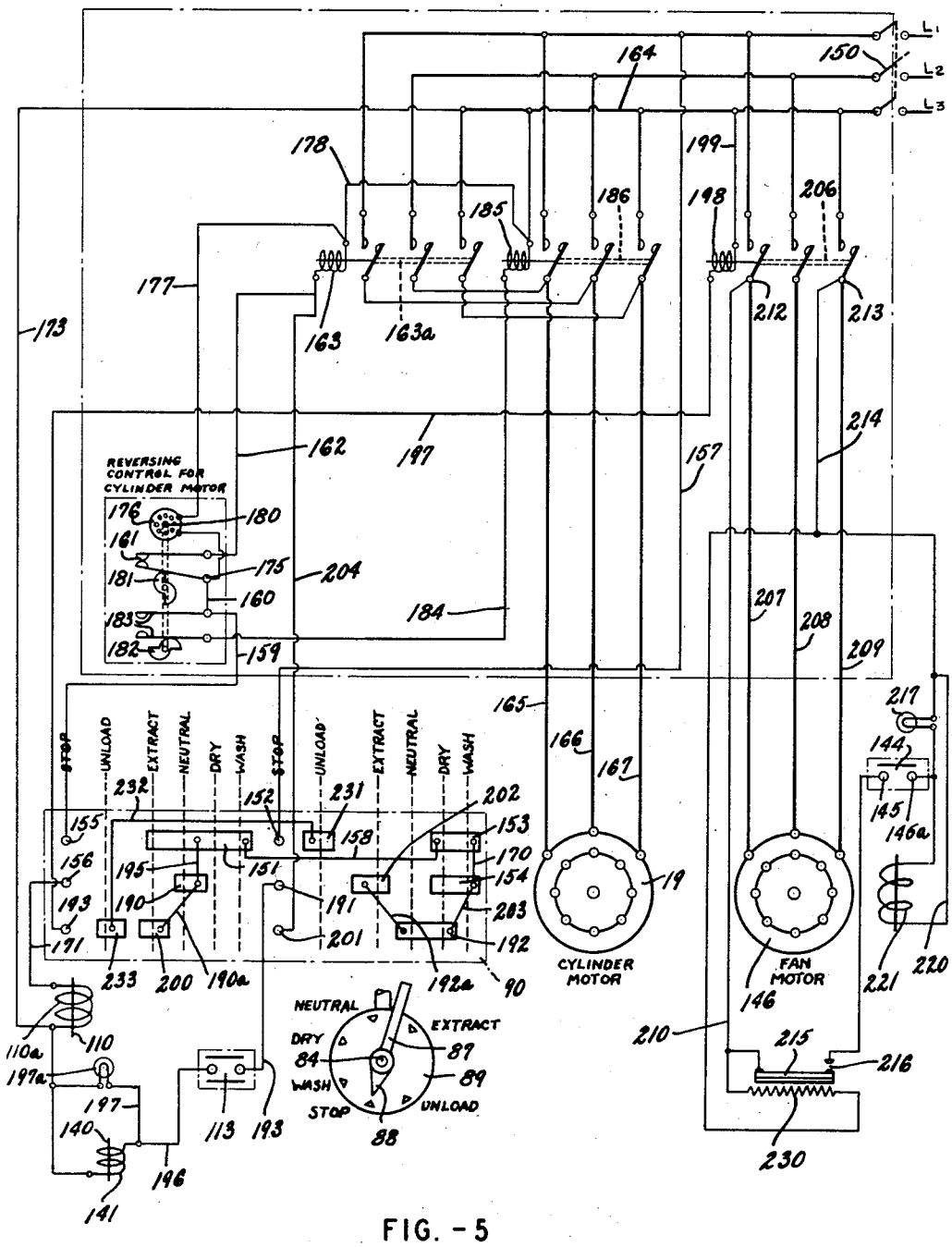

FIG. - 5

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Patented July 18, 1939 2,166,294

UNITED STATES PATENT OFFICE

2,166,294

FABRIC CLEANING APPARATUS

Russell A. Hetzer, Madeira, Ohio, assignor to The American Laundry Machinery Company, Norwood, Ohio, a corporation of Ohio

Application April 29, 1936, Serial No. 76,930

14 Claims. (Cl. 34—5)

My invention relates to fabric cleaning apparatus and more particularly to improved means for controlling the various steps in the operation of the apparatus.

In fabric cleaning apparatus such as that disclosed in my Patent No. 2,074,508, issued March 23, 1937, an apparatus is shown for washing fabric in a volatile solvent, draining the solvent into a sump tank and then drying and deodorizing the fabric.

In the present invention an improved mechanism is provided for controlling the operation of cleaning apparatus during the washing, extracting, drying and unloading operations. It will be understood, however, that I do not desire to limit my improved control mechanism to cleaning apparatus as obviously it may be utilized for other purposes.

In accordance with my invention a central control means is provided, whereby the supply of current to a motor may be cut off, or the operation of the motor may be regulated to provide a reverse or unidirectional operation of a shaft, which in cleaning apparatus is affixed to a rotatable drum containing the fabric being treated. I also provide signalling means for indicating the end of the drying operation, whereby valves in a drying circuit may be manually or automatically operated and the fabric thoroughly deodorized before it is removed from the treating vessel.

It is therefore an object of my invention to provide an improved mechanism for controlling the operation of apparatus, such as cleaning apparatus, by means of which various operations to be performed therein may be controlled from a central point.

Another object of my invention is to provide an improved control mechanism for cleaning apparatus by means of which the motor which operates the rotatable goods container may be reversed during the washing and drying operations, neutralized, and then operated unidirectionally at a high rate of speed during the extracting operation.

Another object of my invention is to provide an improved control mechanism for cleaning apparatus by means of which the moving parts of the driving mechanism must be brought to a complete rest before the control mechanism is moved from the washing or drying position to the extracting position or from the extracting position to the washing or drying position.

A further object of my invention is to provide means to operate a signal when the drying operation is complete, whereby the deodorizing valves may be manually or automatically operated.

A further object of my invention is to provide improved means whereby the motor and other parts of the apparatus may be controlled from a central point in conformity with the operation which is being performed in the system.

My invention will be better understood by reference to the accompanying drawings in which

Fig. 1 is a front elevational view, partly in section and with parts broken away, of a portion of a dry cleaning system;

Fig. 2 is a side elevational view partly in section on the line 2—2 of Fig. 1;

Fig. 3 is a rear elevational view of the system taken on the line 3—3 of Fig. 2;

Fig. 4 is a fragmental plan view of the motor, connecting gears and zero speed switch, the cover of the transmission being removed and the transmission gears being shown in cross section;

Fig. 5 is a diagrammatic view of the control drum showing means for supplying current to the motors, solenoids and signals during the various operations of the system;

Fig. 6 is a side elevational view of the brake taken on the line 6—6 of Fig. 2;

Fig. 7 is a cross sectional view of the control drum on the line 7—7 of Fig. 2;

Fig. 8 is a plan view of zero speed control switch, the cover being removed; and

Fig. 9 is a cross sectional view taken on the line 9—9 of Fig. 8.

As illustrated in the drawings, the cleaning system includes a washer 1 containing the usual rotatable work-container 2. A detergent or cleaning solvent, such as carbon tetrachloride, is supplied to the system through a conduit 3 which leads from a suitable storage tank. Following the washing operation, the solvent is drained from the washer to a sump tank 4 through a conduit 5 which is controlled by a valve 6.

After the solvent has been extracted from the fabric, air is circulated through a drying circuit, including a condenser 7, a fan 8 and a heater 9. The condenser 7 and heater 9 are connected to the casing 1 by means of conduits 10 and 11, respectively. During the drying operation the condensate flows through the conduit 13 into the sump tank 4 and after the fabric has been dried, the valve 14 is opened and valve 15 is rotated to its dotted line position, whereby the conduit 16 between the fan and the heater is closed and the conduit 18 is opened to the atmosphere. Air from the atmosphere is then passed through open valve 14, treating vessel 1, condenser 7 and discharged to the atmosphere through conduit 18. The valves 14 and 15 are normally maintained in closed position by means of a spring 18a and may be simultaneously operated to open position either manually or automatically as will be later described. The dried and deodorized fabric may then be removed from the treating vessel.

The rotatable work-container is operated by a motor 19, see Figs. 3 and 4, which is connected to the drive shaft 20 through transmission 21. As

illustrated in the drawings, see Fig. 4, a gear 23 on motor shaft 24 is connected to a gear 25 on transmission shaft 26 by means of a chain 27. Fixed to the shaft 26 is a pinion 28 and rotatably mounted upon annular bearings 29 is a gear 30. The bearings 29 are seated in a reduced portion 31 of the shaft 26 and are held in position by means of a shoulder 33, nut 34 on the end of shaft 26, and a collar 35 interposed between the two bearing rings. A ring 35a seated in an annular groove formed in the interior of the gear hub prevents the gear from slipping off the shaft. One end of the hub 36 of gear 30 is extended to form a shaft 37 and the other end is broken away to form a jaw 38.

Slidably mounted on the shaft 26 is a clutch member 39 which supports a shifting ring 40. One end of clutch member 39 is provided with a jaw 41 which engages jaw 38 to form a clutch when the operating block is forced to the right, as illustrated in Fig. 4 of the drawings.

In addition to the shaft 26, the transmission includes a shaft 42 which is supported in suitable bearings 43 and 44. Slidably mounted on the shaft 42 is a hub 45 having a gear 46 at one end and a pinion 47 at the other end. The hub 45 is provided with an annular grooved projection 48 which supports a shifting ring 49. Rings 40 and 49 are connected together by means of an apertured yoke 50 having an upwardly extending tubular member 51a which surrounds and is locked to a vertically extending shaft 51 by means of a pin 51b. The shaft 51 is rotatably mounted in the lower portion of casing 21 and extends through an aperture in the upper portion of the casing. When shaft 51 is rotated in an anticlockwise direction as illustrated in Fig. 4, gear 46 is moved out of mesh with pinion 28, pinion 47 is moved out of mesh with gear 30, and the clutch member 39 is shifted to the right. The transmission will then be in neutral position. Upon further movement of shaft 51 in an anticlockwise direction, gear 46 and pinion 47 are shifted further to the left and jaw 41 is forced into engagement with jaw 38.

A gear 52 is attached to shaft 37 and serves to transmit power to the drive shaft 20 through a chain 54 which engages a gear 56 that is affixed to one end of a hub 57, the other end of hub 57 being provided with an outwardly extending flange 58. The hub 57 fits over a collar 59 that is keyed to the shaft 20. Collar 59 is also provided with an outwardly extending flange 60 spaced inwardly from the outer end of the collar which is parallel with flange 58. A ring 61 slidably engages the outer margin of collar 59 and annular friction bands 63 are interposed between flanges 58 and 60 and between flange 60 and collar 61. The hub 57 is secured to collar 59 by bolts 65 which pass through flange 58, ring 61, spring coils 66 and are provided with adjustable nuts 67. The spring coils serve to compress friction bands 63 sufficiently to maintain hub 57 in fixed engagement with collar 59 and power is therefore transmitted from the gear 56 through the friction coupling to drive shaft 20.

As illustrated in Fig. 4 of the drawings, the transmission is from motor 19 through chain 27, shaft 26, pinion 28, gear 46, pinion 47, gear 30, shaft 37, gear 52, chain 54, gear 56 and through the associated friction coupling to drive shaft 20. When jaw 41 is in meshing engagement with the jaw 38, the transmission is directly through shafts 26 and 37, and the friction coupling to shaft 20.

Affixed to shaft 51, see Fig. 2, is a lever 51c which is provided with an apertured block 68 through which a rod 69 extends. The rod 69 is connected to one end of a spring 70, the other end of the spring being connected to a threaded rod or bolt 72 which extends through an aperture in an upwardly extending bracket 71 rigidly mounted on the transmission casing. A nut 72a threaded on rod 72 serves to adjust the tension of spring 70. A coupling 73 is provided at one end of rod 69 which permits limited movement of the rod through the aperture in block 68 but prevents cable 74, which is attached to the other end of the coupling, from being drawn through the aperture in block 68. The rod 69 is threaded at one end and is provided with adjustable nuts 78 which form a seat for a spring 79 which is interposed between nuts 78 and the block 68. The tension of spring 79 may be regulated by adjusting nuts 78. Assuming that the transmission is in neutral position and that the tension cable 74 has been released, if gear 46 and pinion 28 and pinion 47 and gear 30 are in proper position for meshing, the action of the spring 70 upon coupling 73 is sufficient to rotate lever 51c to the left as shown in Fig. 2 of the drawings and shaft 51 in a clockwise direction, as shown in Fig. 4 and the gears will be shifted into mesh. If the gears, however, happened to engage tooth to tooth, energization of motor 19 will advance pinion 28 to the proper position so that the spring 70 under tension will force gear 46 into mesh with pinion 28 and as pinion 47 is advanced spring 70 will force it into meshing engagement with gear 30.

The cable 74 is guided by an idler pulley 80 into engagement with a pulley 81, the free end of cable 74 being connected to a bracket 82 which is integral with pulley 81. Pulley 81 is rigidly attached to control shaft 84 which is operated by a lever or handle 87 as illustrated in Figs. 1 and 2 of the drawings. The lever 87 is provided with a pointer 88 and is adapted to move over a dial 89 at different points upon which are symbols indicating the various operations which are to be performed in the system. Dial 89 is provided with a series of apertures 89a which are adapted to receive a stud 89b attached to one end of a lever 89c which is pivotally mounted at the point 89d on the main lever 87. A spring 89e normally maintains the stud 89b in one of the notches 89a. When pressure is applied to the opposite end of lever 89c, stud 89b is withdrawn from the aperture and lever 87 may be moved to the desired position.

Shaft 84 is connected to an adjustable control device 90 by means of couplings 91 and 92. Control device 90 includes a drum 90a formed of insulating material on the periphery of which are mounted a plurality of conducting segments 90b, as illustrated in Figs. 2 and 7 of the drawings and diagrammatically in Fig. 5. As shown in Fig. 5 the segments are electrically connected together by means of conductors in a predetermined manner.

Arranged in a housing 93 which surrounds control device 90 is a metal strip 94, see Figs. 2 and 7, which is supported by means of a bracket 95. An insulating plate 96 formed of rubber or other electrical insulating material is attached to metal strip 94. Supported upon the insulating plate 96 are three pairs of metal leads 96a which are connected to a suitable source of electrical energy as indicated in Fig. 5 of the drawings. A pair of metal contacts 97 extend downwardly

from each pair of leads and are positioned to engage the various metallic segments 90b during the rotation of drum 90a. As drum 90a is rotated various circuits are accordingly established, depending upon the relation of the various segments with the contacts, which control the operating parts of the apparatus as will be hereafter more fully described.

When the pointer 88 of lever 87 is moved to the wash or dry position as shown by the indicating dial in Fig. 1, current is supplied to the motor and part of the slack on cable 74 is taken up. If the gears are not in mesh, the operation of shaft 26 rotates gear 28 to the proper position so that spring 70 will force the gears into meshing relationship.

When the pointer 88 of the lever 87 is moved to the neutral position, all of the slack has been taken up in cable 74 and rod 69 has been drawn to the right a certain distance so that the nut 78 on the rod 69 through the spring 79, Fig. 2, forces lever 67 to the right thus rotating shaft 51 in an anti-clockwise direction, Fig. 4, which shifts gear 46 out of mesh with pinion 28 and pinion 47 out of mesh with gear 30; consequently, no power will be transmitted from the motor 19 to the drive shaft 20. When the lever is turned to move the pointer to the extracting position, the cable 74 and the rod 69 which is attached to coupling 73 is further moved to the right, and through the spring 79, the lever 51c is further moved to the right rotating the shaft 51 farther in an anti-clockwise direction which forces jaw 41 on block 39 into engagement with jaw 38 on hub 36. The spring 79 is strong enough to perform this shifting operation under normal conditions without any substantial compression. If, however, the jaw members engage tooth to tooth the spring 79 compresses and permits continued movement of the lever 87 to the extracting position whereupon the motor 19 is energized advancing the clutch 39 sufficiently to properly register the jaws thereon between the jaws on hub 36 and the stored energy in the compressed spring 79 completes the meshing engagement.

The drive shaft 20 is supported by bearings 98 mounted upon frame 99. A brake mechanism for shaft 20 is also supported on frame 99. The brake mechanism is of the usual type and comprises a drum 100 which is keyed to drive shaft 20 as indicated by the numeral 101. A brake band 102 adjustably anchored in bracket 103 of the drum frame is held in braking engagement with drum 101 by the action of spring 105. As illustrated in the drawings, a bracket 106 extends upwardly from the drum frame to which a bell crank 107 is pivotally attached. One arm of the bell crank is pivotally attached to a lever 108, thereby forming a toggle link, the other end of lever 108 being pivotally attached to one end of the brake band at the point 108a. The spring 105 is coiled around a rod 109 which is attached at one end to the pivot pin connecting bellcrank 107 to lever 108 and extends through an aperture in a boss 106a on bracket 106 and is provided with an adjustable nut 109a at its opposite end. The spring 105 bearing against the nut 109a normally maintains the brake in operative position. The other arm of the bell crank lever 107, however, is pivotally attached to the armature 110 of a solenoid 110a. When solenoid 110a is energized armature 110 is forced downwardly, the toggle link is forced inwardly against the action of the spring 105 and the brake is released. Spring 105a is provided to produce a quick separation of the ends of the band when the brake is released.

Shaft 24 of motor 19 is also provided with a gear 111 which is connected with a gear 111a on the shaft 112 of a zero speed switch 113. Switch 113 which is illustrated more particularly in Figs. 8 and 9 of the drawings, is enclosed in a casing 114 and includes a disk 115 which is pinned to shaft 112, and a disk 116 which is rotatably mounted upon the shaft. Supported upon disk 116 is an arm 118 formed of electrical insulating material which carries two sets of electrical contacts 119 and 120. An electrical insulating plate 122 supported by a bracket 123 which is fastened to the casing 114 also carries a pair of contacts 124 located opposite contacts 119 and a pair of contacts 125 which are located opposite contacts 120. The arm 118 is attached to disk 116 by means of screws passing through a metal strip 126 which extends beyond both sides of the insulating arm and forms an anchor for a pair of springs 128 and 129. When shaft 112 is rotated the friction between the disks 115 and 116 moves contacts 119 into engagement with contacts 124 or contacts 120 into engagement with contacts 125 according to the direction of rotation of shaft 112, thereby establishing an electric circuit. When the shaft is at rest, however, spring 128 or spring 129 separate the contacts and break the circuit.

Pulley 82 is provided with a block 132 to which a boss 133 having a slot 134 therein is affixed. A latch 135 having an arm 139 is pivoted to the control drum casing 93 and when shaft 84 is rotated to neutral position slot 134 is in alignment with latch 135. The latch 135 is normally held out of engagement with slot 134 by means of a weight 136 on the arm 139 which is held in the proper position by means of a spring 137 coiled around rod 138 one end of which is supported by nuts 138a threaded on the rod. The rod 138 extends through an aperture in the arm 139, and is attached to the armature 140 of a solenoid 141. When contacts 119 engage contacts 124 or contacts 120 engage contacts 125 as previously specified, an electric circuit is established through solenoid 141 which raises the armature 140 and forces the latch 135 into the slot 134 thereby preventing further rotation of shaft 84 until the contact in the zero speed switch is broken and solenoid 141 is deenergized at which time weight 136 releases latch 135.

Means are also provided for indicating when the drying operation is complete. As illustrated in Fig. 1 of the drawings, the conduit 13 is provided with a chamber 13a. Pivotally mounted upon a rod 13b in chamber 13a is a lever 13c having a bucket 143 at one end and a weight 144 at the other end. The bottom of the bucket is provided with a small aperture 143a. During the drying operation the condensate flows through the conduit 13 into the bucket 143 accumulating therein faster than it can flow through the aperture 143a. When the bucket is full or partially full with liquid, the weight 144 is raised out of engagement with the contacts. When the fabric in the washer is dried, however, the flow of condensate ceases and the liquid flows out of the bucket. The weight 144 which is heavier than the empty bucket then falls into engagement with contacts 145 thereby closing an electrical circuit. A motor 146 operates the fan 8 during the drying operation and the system is provided with suitable vent pipes 147. A door 148 is also provided to introduce the fabric into the washer.

The operation of the system will become apparent from a description of the control device and the circuits shown in Fig. 5 of the drawings. Fabric is placed in the washer, lever 87 is set so that pointer 88 is at the stop position indicated on the dial 89 of Fig. 1, line switch 150 is closed, and if the transmission gears are in neutral and in proper position for meshing, spring 70 forces gear 46 and pinion 47 in mesh with pinion 28 and gear 30, respectively.

The lever 87 is then rotated to move pointer 88 to the wash position, which rotates insulating drum 90a in a clockwise direction, as shown in Fig. 2 of the drawings looking at the control drum from the left or to the right as illustrated diagrammatically in Fig. 5 of the drawings, moving segment 151 into engagement with terminal 152 and segments 153 and 154 into engagement with terminals 155 and 156. A circuit is thus established from line L_1 through conductor 157, terminal 152, segment 151, conductor 158, segment 153, terminal 155, conductors 159 and 160, switch 161, conductor 162, coil 163 and conductors 178 and 164 to line L_3. The energization of coil 163 closes switch 163a and current is supplied to the motor 19 through conductors 165, 166 and 167 from lines L_2, L_1 and L_3.

A circuit is also established from line L_1 to conductor 157, terminal 152, segment 151, conductor 158, segment 153, conductor 170, segment 154, terminal 156, conductor 171, solenoid 110a and conductor 173 to line L_3. Energization of coil 110a draws armature 110 downwardly releasing the brake on shaft 20. It will be noted that a circuit is also established from terminal 175 to motor 176 and conductors 177, 178 and 164 to line L_3.

Motor 176 drives a cam shaft 180 which is provided with cams 181 and 182 which alternately closes switch 161 and switch 183. These switches are normally maintained in open position by any suitable means, such as springs (not shown). As illustrated in Fig. 5 of the drawings, switch 161 is closed and switch 183 is open. When switch 183 is closed and switch 161 is open, the current passes through switch 183, conductor 184, coil 185 and conductor 164 to the line L_3. Coil 185 is therefore energized which closes switch 186 and current is supplied to the motor 19 through conductors 165, 166 and 167 from lines L_1, L_2 and L_3 and, consequently, the motor 19 will be rotated in a reverse direction.

After the dirt and grease have been removed from the fabric by the cleaning medium, which is preferably carbon tetrachloride, valve 6 is opened and lever 87 is rotated to neutral position, thereby rotating the shaft 84 and pulley 82 in a clockwise direction. Rotation of pulley 82 pulls the cable 74 forwardly and nut 78 forces spring 79 into engagement with lever block 68 which shifts the gears out of mesh. The rotation of pulley 81 also brings the notch or recess 134 on boss 133 in a position opposite latch 135.

When the control lever is in the neutral position, segment 151 is in contact with terminal 152, segment 190 is in contact with terminal 191 and segment 192 is in contact with terminal 193. A circuit is thus established from line L_1 through conductor 157, terminal 152, segment 151, conductor 195, segment 190, terminal 191, conductor 193, switch 113, conductor 196, solenoid 141, conductor 173 to line L_3. Energization of solenoid 141 raises armature 140 and forces the latch 35 into recess 134, thereby preventing operation of lever 87 until the driving parts come to complete rest. A circuit is also established through conductor 197 which is in parallel with coil 141 so that as long as the driving parts are moving the light 197a is illuminated indicating that the apparatus is still in motion. It will be noted that during this period the brake solenoid 110a is deenergized and the brake is applied.

A circuit is also established from line L_1 through conductor 157, terminal 152, segment 151, conductor 158, segment 153, conductor 170, segment 154, conductor 203, segment 192, terminal 193, conductor 197, coil 198 and conductors 199 and 164 to line L_3. Coil 198 is thus energized which closes switch 206, thereby supplying current to motor 146 which operates fan 8.

When the moving parts have come to rest, spring 128 or spring 129 breaks the circuit in switch 113 depending upon the direction of rotation of motor 19, thereby deenergizing coil 141 and extinguishing light 197a. When coil 141 is deenergized, armature 140 drops and the weight 136 draws the latch 135 from the recess 134 and the lever 87 may be again rotated.

The lever 87 is then rotated to move pointer 88 to the extracting position, and as the cable 74 is drawn around pulley 82, sufficient pressure is exerted upon block 68 to shift jaw 41 of clutch member 39 into meshing engagement with jaw 38 of gear hub 36 and power from the motor 19 is transmitted directly through shaft 26, chain 54 and its associated friction coupling to drive shaft 20.

The rotation of lever 87 to the extracting position moves the drum in a clockwise direction or further to the right, as illustrated diagrammatically in Fig. 5, moving segment 200 into engagement with terminal 201, segment 202 into engagement with terminal 156 and segment 151 still remains in engagement with terminal 152. A circuit is thus established from the line through conductor 157, terminal 152, segment 151, conductor 195, segment 190, conductor 190a, segment 200, terminal 201, conductor 204, coil 163 and conductor 164 to line L_3. The coil 163 is energized and current is supplied to the motor from lines L_1, L_2 and L_3 to conductors 166, 165 and 167 which operates the motor. It will be noted that no current is supplied to motor 176 so that the rotation of motor 19 will be unidirectional. Since power is transmitted directly through the shaft 26, gear 56 and its associated friction coupling to drive shaft 20, the speed of the rotating drum will be much greater during the extraction operation than during the washing operation.

During the extraction operation, a circuit is also established from line L_1, through conductor 157, terminal 152, segment 151, conductor 158, segment 153, conductor 170, segment 154, conductor 203, segment 192, conductor 192a, segment 202, terminal 156, conductor 171, solenoid 110a and conductors 173 and 164 to line L_3. The solenoid controlling the brake is therefore energized and the brake is released.

After the extraction operation is completed the valve 6 is closed, the lever is rotated back to neutral and the moving parts are brought gradually to rest. The lever is then moved in an anticlockwise direction to the drying position sufficient slack being provided in the cable in this position to permit spring 70 to shift the gears into mesh in the manner previously specified.

The same circuits are established during the drying operation as in the washing operation. In addition, a circuit is established from line 157, terminal 152, segment 151, conductor 158, segment

153, conductor 176, segment 154, conductor 203, segment 192, terminal 193, conductor 197, coil 198 to line L_3. The energization of coil 198 closes switch 206 which supplies current to the fan motor 146 through conductors 207, 208 and 209, and to resistor 230 through conductors 210 and 214.

When the drying operation is complete and the weight 144 bridges contacts 145 and 145a, and bimetallic conductor 215 is heated sufficiently to close switch 216, a circuit is established from terminal 213 through conductor 214, a light 217, terminal 145a, weight 144, terminal 145, switch 216, bimetallic conductor 215 and conductor 210 to terminal 212. The light 216 acts as a signal to indicate that the drying operation is complete. A circuit comprising a conductor 220 and solenoid 221 is also provided in parallel with the light. When solenoid 221 is energized, see Fig. 1, it draws armature 222 downwardly, thereby actuating crank 223 which moves levers 224, 225, 226 and 227 to the dotted line position. Valve 14 is thereby opened to the atmosphere and valve 15 is forced downwardly into the dotted line position closing the conduit between the fan and the heater and opening the conduit 18 to the atmosphere.

The bimetallic conductor is provided to prevent the operation of the levers before the drying operation commences. It will be noted that when the switch 206 is first turned on, the light 217 and coil 221 will not be energized. A resistor 230 however will be heated which in turn heats the bimetallic conductor 215 closing the switch 216. When switch 216 is closed, however, the drying operation is in progress and the liquid in bucket 143 prevents energization of solenoid 221 until the drying operation is completed.

After the fabric has been dried and deodorized, the lever 87 is moved first to the stop position and then to the unload position. When the lever 87 is moved to the unload position, a circuit is established from line L_1 through conductors 157, terminal 152, segment 231, conductor 232, segment 233, terminal 193, conductor 197, coil 198 and conductor 199 to line L_3. The energization of coil 198 closes switch 206 and a current is supplied to the fan motor. All other circuits are open.

From the foregoing specification it will be apparent that I have provided an improved control mechanism, whereby all operations in the machine may be controlled by a single lever.

It will also be seen that between the washing and extracting operations and between the extracting and drying operations it is necessary that all moving parts except the fan be brought to rest, at which time the breaking of the light circuit indicates that it is safe to operate the lever to the desired position. The system may therefore be operated in a manner which is conducive to safety.

By providing improved signal means and automatic lever operating devices it will also be apparent that the system may be readily operated from an accessible position and that the danger of operating improper controls will be minimized.

It will also be seen that I have provide improved means for shifting the transmission gears to neutral position or to the desired position for washing, drying or extraction.

To those skilled in the art many modifications and widely different embodiments and applications of my invention will suggest themselves without departing from the spirit and scope thereof. My disclosure and description herein are purely illustrative and are not intended to be in any sense limiting.

What I claim is:

1. Apparatus of the class described and having a rotatable work-container, driving motor means therefor, transmission means effective to provide operation of said container by said motor means at different speeds, motor control means for said motor means arranged to provide for its operation either unidirectional or with periodic reversals, and control means connected with said transmission means and with said motor control means and thereby interconnecting the latter, and adapted to be set by the operator to provide either low speed operation of said container with periodic reversal thereof, or high speed unidirectional operation thereof.

2. Apparatus of the class described and having a rotatable work-container with a front loading and unloading opening, driving means for said container located rearward thereof and including motor means, motor control means, transmission means, and transmission control means, and operator-operated control means interconnecting said motor control means and said transmission control means and having a single handle for its setting by the operator, located adjacent said container opening.

3. A fabric cleaning apparatus comprising a treating vessel having a rotatable work container, a drive shaft for said container, electrically operated means for driving said shaft, an adjustable control device, a source of electrical energy, means for supplying current from the source of electrical energy to the electrically operated means to alternately rotate the work container in reverse directions when the control device is in one position, and means for supplying current from said source to the electrically operated means to rotate the drive shaft unidirectionally when the control device is in a second position.

4. A fabric cleaning apparatus comprising a treating vessel having a rotatable work container, a drive shaft for said container, electrically operated means for driving said shaft, an adjustable control device, a shaft for rotating the control device, a handle connected to the shaft of the control device, a source of electrical energy for supplying current to the electrically operated means to alternately rotate the work container in reverse directions when the control device is in one position, said control device serving to disconnect the supply of current to the electrically operated means when the handle is moved to set the control device to a different position and to supply current to the electrically operated means to rotate the shaft in one direction when said handle is moved to set the control device to a third position.

5. A fabric cleaning apparatus comprising a treating vessel having a rotatable work container, a drive shaft for said container, electrically operated means for driving said shaft, a brake for said drive shaft, electrically operated means for releasing said brake, an adjustable control device, a source of electrical energy for supplying current to the drive shaft operating means and the brake releasing means when the control device is in a predetermined position to release the brake and operate the drive shaft in one direction, and means whereby current may be supplied to the brake releasing means and the drive shaft operating means to operate the drive shaft with

periodic reversals thereof when the control device is moved to a different position.

6. A fabric cleaning apparatus comprising a treating vessel having a work container, a drive shaft for said container, electrically operated means for driving said shaft, an adjustable control device, a brake for said drive shaft, means for applying the brake to the shaft, electrically operated means for releasing said brake, a source of electrical energy for supplying current to the drive shaft operating means and to the brake releasing means when the control device is in a predetermined position, the supply of current to the motor and the brake releasing means being disconnected when the control device is moved to a second position, whereby the brake is applied to said shaft, and means associated with said shaft-driving means and being effective during the driving of the shaft for preventing the movement of said control device until the driving means is at rest.

7. Apparatus of the class described, comprising a driving shaft, means for driving said shaft, control means for said shaft-driving means, a source of power supply for said shaft-driving means and said control means, an adjustable control device operatively associated with the source of power and with said shaft-driving means and control means and adapted to be set to provide high speed operation of said shaft in alternately reverse directions or high speed unidirectional operation thereof.

8. Apparatus of the class described, comprising a driving shaft, means for driving said shaft, a source of power for said shaft-driving means, a transmission, an adjustable control device connected to said shaft driving means, said transmission and said source of power, said control device being adapted to be set in one position to supply power to said shaft-driving means and to provide low speed operation of said shaft, and to be set in a second position to supply power to said shaft-driving means and provide high speed operation of said shaft.

9. Apparatus of the class described, comprising a driving shaft, means for driving said shaft including a transmission, an adjustable control device connected to said transmission and said shaft-driving means, spring means associated with said control device and said transmission for shifting said transmission to provide low speed operation of said shaft when said control device is set in one position, and a second spring means associated with said control device and said transmission for shifting said transmission to provide high speed operation of said shaft when said control device is set in a different position.

10. Apparatus of the class described, comprising a driving shaft, an adjustable control device, means for driving said shaft, means associated with said control device and the shaft-driving means when the control device is in a predetermined position, whereby said shaft is driven in alternately reverse directions, means associated with said control device and the shaft-driving means whereby said shaft is driven unidirectionally when the control device is set in a second position, and means associated with said shaft-driving means and being effective during the driving of said shaft for preventing the movement of the control device from the first position to the second position until said driving means has been brought to rest.

11. Apparatus of the class described, comprising a driving shaft, an adjustable control device, motor means for driving said shaft, motor control means associated with said control device, and said motor means when the control device is in a predetermined position, whereby said shaft is driven in alternately reverse directions, means whereby said control device may be set in a second position, means associated with said control device and said motor means whereby said shaft is driven unidirectionally when said control device is set in the second position, and means associated with said motor and being effective during its operation for preventing movement of said control device from the first position to the second position or from the second position to the first position until said motor means is brought to rest.

12. Apparatus of the class described, comprising a treating vessel having a rotatable work container provided with a loading and unloading opening, a drive shaft for said container, braking means for said shaft, an adjustable control device, means for driving said shaft when the control device is in a predetermined position, a shaft for said control device, and a handle located adjacent the front of the treating vessel by means of which the shaft of the control device may be moved to a second position which renders the driving means for the shaft inoperative, and means for applying said braking means when the control device is in the second position.

13. Apparatus of the class described, comprising a treating vessel having an outer casing and an inner work container provided with a front loading and unloading opening, driving motor means for rotating said work container, a drying circuit connected to said treating vessel including a condenser and air-moving means, motor means independent of the motor-driving means for said container for driving said air-moving means, an adjustable control device operatively associated with the driving means for said air-moving means and for the driving means for said container and having a handle located adjacent said opening for setting said control device to provide simultaneous operation of the motor means for said container and for said air-moving means or to provide selective operation of either of said motor driving means.

14. A fabric-cleaning apparatus, comprising a treating vessel for fabric which has been treated with a volatile solvent, said vessel having an outer casing and an inner work container, a drying circuit connected to said treating vessel including a fan for moving air through said circuit to dry the fabric in said treating vessel, a condenser for vapors carried by the air, conduit means leading from said condenser through which the condensate flows, a signal for indicating when the drying operation is complete, means independent of the flow of the condensate for preventing the operation of said signal until the fan has been in operation for a predetermined portion of the drying time, and means dependent upon the flow of the condensate for preventing the operation of the signal during the remainder of the drying time.

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