July 1, 1941. G. W. DUNHAM 2,247,803

IRONER

Filed Dec. 22, 1938 3 Sheets-Sheet 1

Fig. 1.

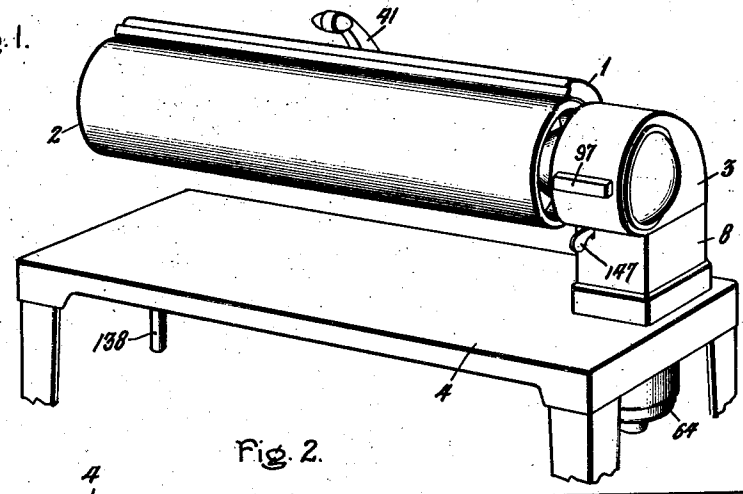
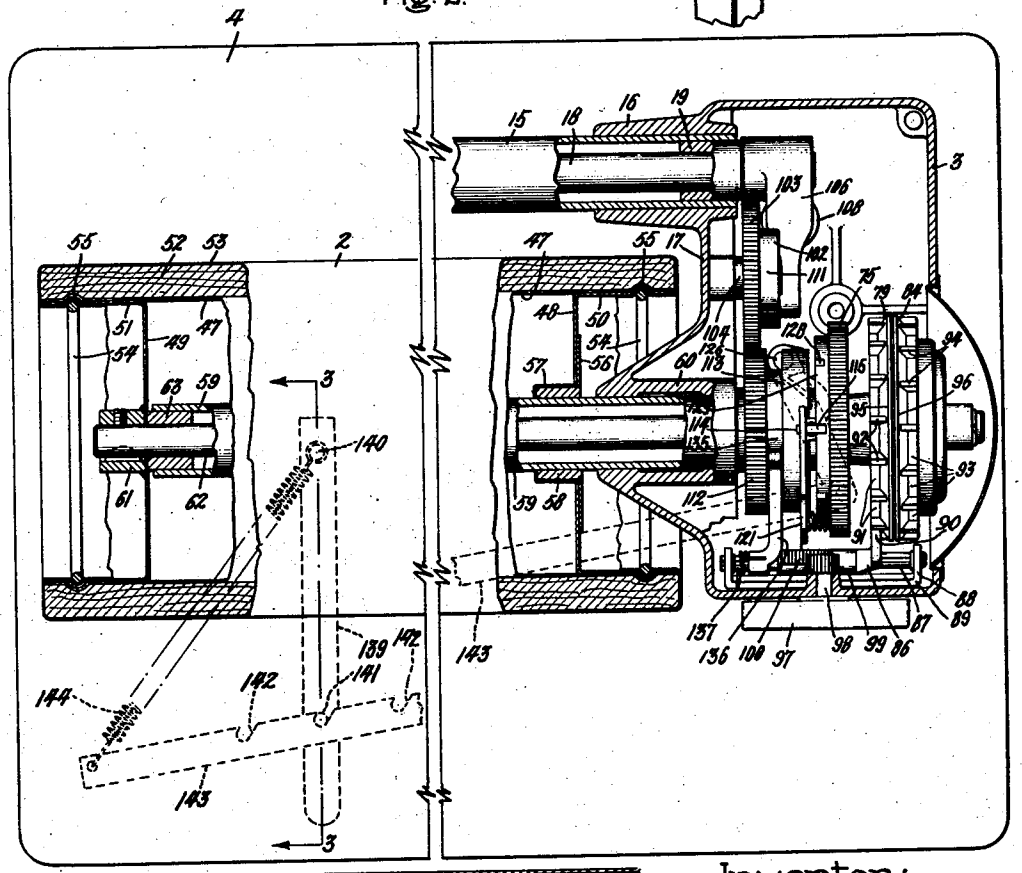


Fig. 2.



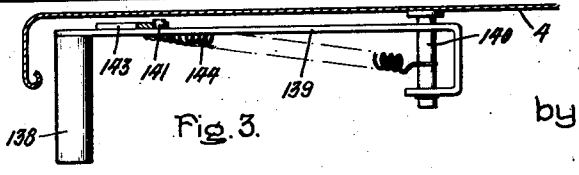


Fig. 3.

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July 1, 1941. G. W. DUNHAM 2,247,803

IRONER

Filed Dec. 22, 1938 3 Sheets-Sheet 2

Fig. 4.

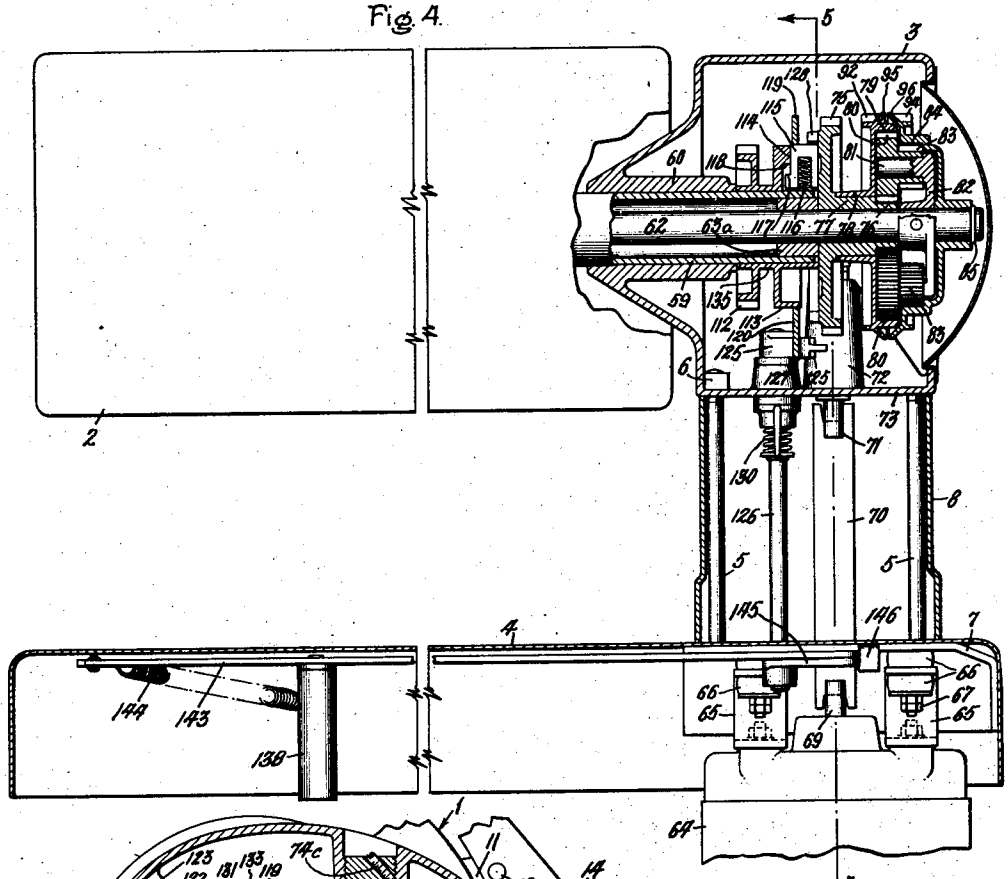


Fig. 5.

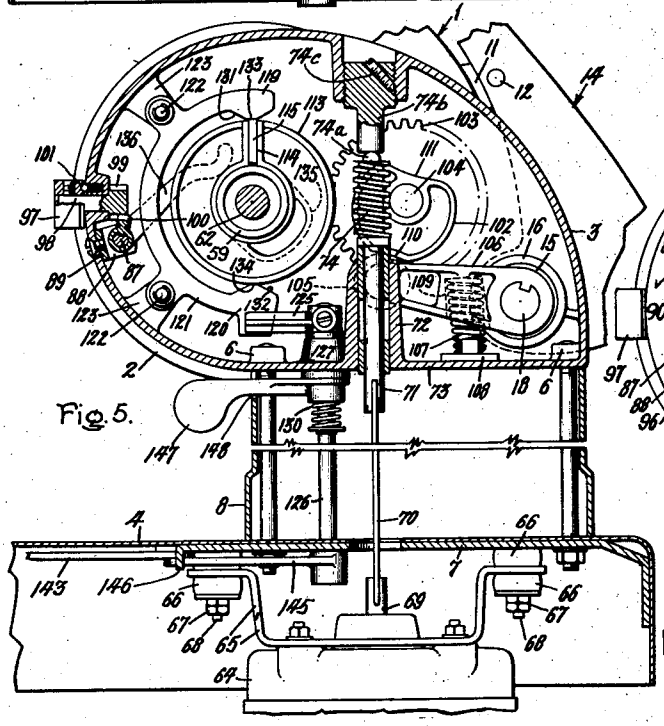
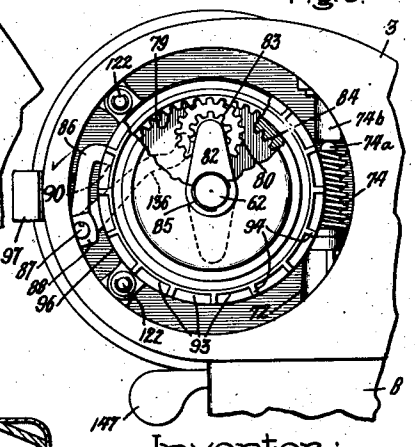


Fig. 6.



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July 1, 1941. G. W. DUNHAM 2,247,803

IRONER

Filed Dec. 22, 1938 3 Sheets-Sheet 3

Fig. 7.

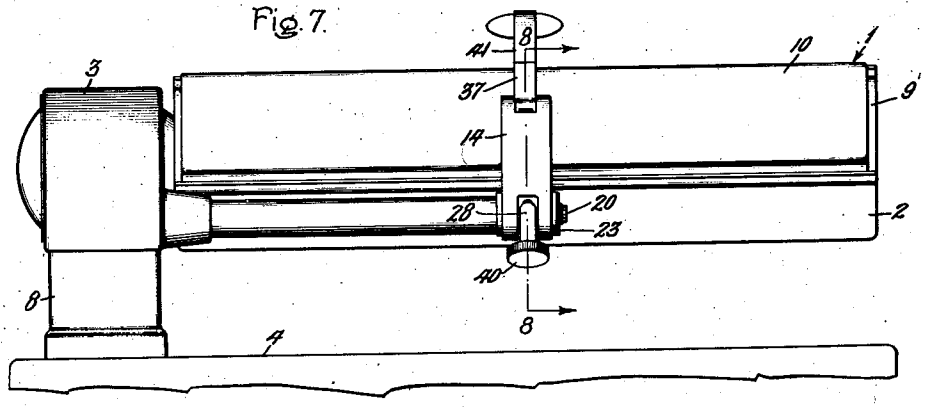


Fig. 8.

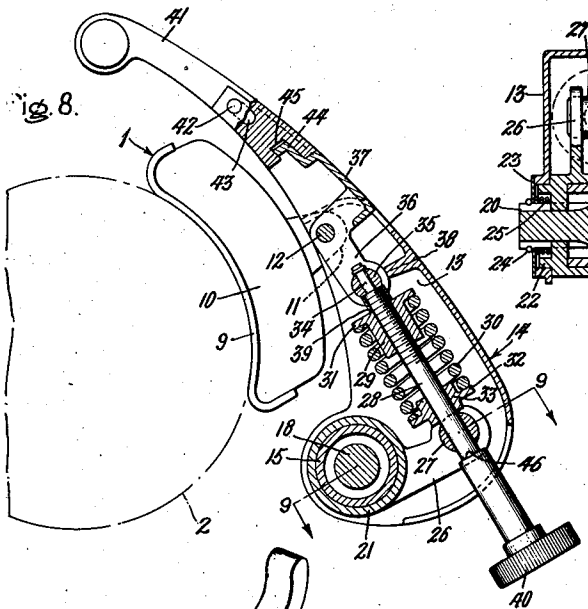


Fig. 9.

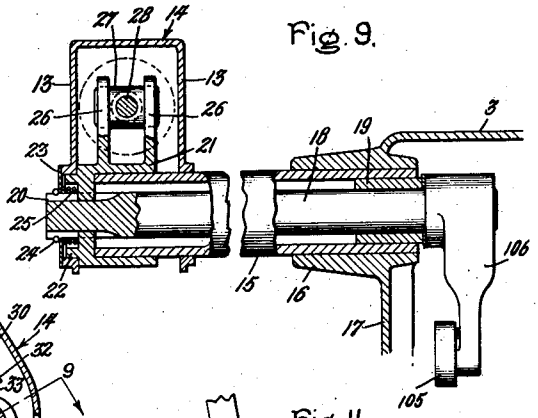


Fig. 11.

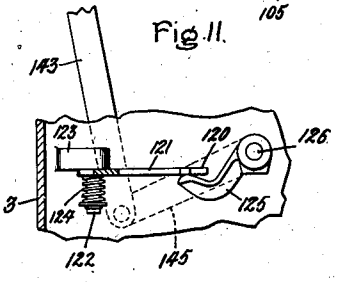
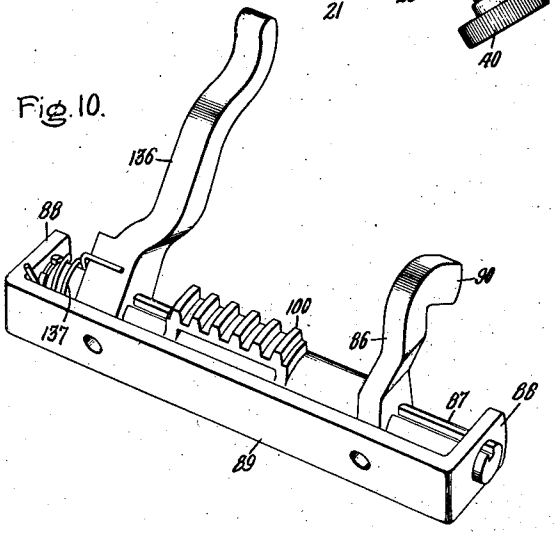


Fig. 10.



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Patented July 1, 1941 2,247,803

UNITED STATES PATENT OFFICE

2,247,803

IRONER

George W. Dunham, Westport, Conn., assignor to General Electric Company, a corporation of New York

Application December 22, 1938, Serial No. 247,256

9 Claims. (Cl. 38—61)

This application is a continuation in part of my application Serial No. 126,373, filed February 18, 1937.

The present invention relates to ironing machines of the type in which ironing is effected between a heated shoe and a padded roll.

The object of my invention is to provide an improved construction and arrangement in ironing machines of this type, and for a consideration of what I believe to be novel and my invention attention is directed to the accompanying description and the claims appended thereto.

In the accompanying drawings, Fig. 1 is a perspective view of an ironer embodying my invention; Fig. 2 is a top plan view partly broken away to show the driving mechanism and the construction for supporting the roll and shoe; Fig. 3 is a sectional view of the knee operated control taken on line 3—3 of Fig. 2; Fig. 4 is a sectional front elevation of the ironer; Fig. 5 is an end elevation in section along line 5—5 of Fig. 4, the parts being in the position in which the shoe is pressed against the roll; Fig. 6 is an end elevation of the driving mechanism; Fig. 7 is a rear elevation of the ironer; Fig. 8 is a sectional view taken on line 8—8 of Fig. 7; Fig. 9 is a sectional view taken on line 9—9 of Fig. 8; Fig. 10 is a perspective view of the control member for the roll driving mechanism; and Fig. 11 is a fragmentary view of the other end of the linkage connected to the knee operated member.

Referring to the drawings, the ironer comprises a shoe 1 and a roll 2 which are carried by a housing 3 containing mechanism for rotating the roll and for moving the shoe toward and away from the roll. The housing is secured to the top 4 of a suitable table by bolts 5 extending from lugs 6 on the housing through a re-enforcing plate 7 on the under side of the table (see Fig. 5). The housing is seated on a hollow rectangular spacing member 8 and is held thereon by the bolts 5.

The shoe (Fig. 8) comprises an arcuate metal plate 9 which is heated by suitable electric heating elements (not shown) arranged between the rear surface of the plate and a cover 10. Fixed to the shoe is a bracket having ears 11 which are pivoted on a pin 12 extending across the spaced side walls 13 of a shoe supporting arm 14 supported on a tube 15 fixed in a boss 16 (Fig. 9) in the side wall 17 of the ironer housing. Extending through the tube 15 is a rock shaft 18 having one end journaled in a bearing 19 and having the other end 20 splined in the hub of an arm 21 journaled on the outer end of the tube. One of the side walls 13 of the shoe supporting arm is journaled on the tube 15 and the other is journaled on a flange 22 on the hub of the arm 21. The shoe supporting arm is held on the tube by a washer 23 held on the splined end of the shaft 18 by a snap ring 24. A coil spring 25 arranged between the washer 23 and the arm 21 holds the arm against the end of the tube 15.

The arm 21 has forked ends 26 between which a shaft 27 is pivoted. Slidably extending through the shaft 27 is a rod 28 threaded into a nut 29. Around the rod 28 is a coil spring 30 arranged between a seat 31 on the nut 29 and a seat 32 on a washer 33 slidable on the rod and pressed by the spring against the shaft 27. The end of the rod 28 projecting beyond the nut 29 is provided with a reduced portion 34 rotatable in a pin 35 fixed between the forked ends 36 of a lever 37 pivoted on the pin 12. The forked ends 36 of the lever and the rod 28 with its associated spring provide a toggle connecting the shoe supporting arm 14 with the arm 21. As shown in Fig. 8, the toggle is slightly over center and is held against a stop 38 on the shoe supporting arm. Upon oscillation of the shaft 18 the shoe is moved toward and away from the roll. The pressure between the shoe and roll is limited by the coil spring 30. The pressure may be adjusted by threading the rod 28 into and out of the nut 29, thus varying the pressure of the spring. The minimum pressure is limited by a sleeve 39 arranged between the nut 29 and the pin 35. For convenience in adjusting the pressure, the rod 28 is provided with a handle 40 projecting through the lower end of the shoe supporting arm to a conveniently accessible position.

Under some circumstances it is desirable to release the pressure between the roll and shoe independent of the rock shaft 18. This is effected by a clockwise rotation of the lever 37 as viewed in Fig. 8. For this purpose, the lever 37 is provided with a hand lever 41 fastened to the lever 37 by a pin 42 fixed in the lever 37 and extending through a slot 43 in the lever 41 and by a tongue 44 on the lever 37 fitting in a notch 45 in the hand lever. By lifting the hand lever to a position in which the tongue 44 is clear of the notch 45, it may be swung downward about the pin 42 to a space-saving position useful during shipping.

When the lever 37 is pivoted in a clockwise direction from the position shown in Fig. 8, the toggle connecting the arms 21 and 14 is broken, permitting the shoe supporting arm 14 to pivot in a clockwise direction about the shaft 18 and

thereby to move the shoe away from the roll. If the shoe is away from the roll this additional separation permits the movement of the shoe to a position permitting cleaning and waxing. In this position the expansion of the spring 30 is limited by the engagement of a shoulder 46 on the rod 28 with the under side of the shaft 27. Upon clockwise movement of the lever 37 the parts may be returned to the position shown in Fig. 8. The above described mechanism is the invention of Charles A. Lindemann and is being claimed in his application Serial No. 184,405, filed January 11, 1938, to which reference may be had for a more extensive description.

The roll (Fig. 2) comprises a sheet metal cylinder 47 having disks 48 and 49 at each end secured thereto respectively by means of flanges 50 and 51 secured to the inner surface of the cylinder. On the outer surface of the cylinder is a pad 52 which is held thereon by means of a pad cover 53. The pad cover is held in place by means of snap rings 54 which fit in grooves 55 in the flanges 50 and 51. The disk 48 is secured to the flange 56 of a sleeve 57 carrying a sleeve bearing 58 which rotatably supports the roll on a tube 59 fixed in a boss 60 in the ironer housing wall 17. The disk 49 is fixed to a sleeve 61 which is keyed to a shaft 62 journaled in bearings 63 and 63a in the tube 59. The roll is rotated by the shaft 62 through the driving connection formed by the sleeve 61 and the disk 49.

The ironer is operated by an electric motor 64 which is resiliently supported from the re-enforcing plate 7 by means of arms 65 secured to rubber bushings 66. The compression of the rubber bushings, and therefore the resilience of the mounting, is varied by means of nuts 67 which are threaded on spindles 68 secured to the plate 7. The motor shaft 69 is slotted to receive a bar 70 which fits in the slotted end of a shaft 71 and serves as a coupling between the shafts. The shaft 71 is journaled in a boss 72 which is integral with the bottom wall 73 of the ironer housing. The shaft 71 has cut therein a worm 74 which meshes with a worm wheel 75 rotatably carried on the roll driving shaft 62. The thrust of the worm shaft 71 is taken by a ball 74a which bears against the end of plug 74b threaded in the top wall of the ironer housing. After adjustment, the plug 74b is prevented from turning by means of a set screw 74c.

Integral with the worm wheel 75 is a hub having a pinion 76 cut therein and having a bearing surface 77 on which is rotatably carried the hub 78 of internal gear 79. The internal gear 79 meshes with gears 80 which are rotatably carried on stub shafts 81 integral with an arm 82 which is pinned to the roll driving shaft 62. The gears 80 also mesh with the pinion 76. The pinion 76, the internal gear 79, the gears 80, and the arm 54 comprise an epicyclic or planetary gear train which provides a speed reducing driving connection between the continuously rotating worm wheel 75 and the roll driving shaft 62. When the rotation of the internal gear 79 is not restrained, the friction in the bearings of the roll shaft 62 is sufficient to hold the roll shaft stationary. When the internal gear 79 is held stationary, the planetary gearing provides a speed reducing driving connection to the roll shaft.

A second and lower speed planetary gear train is provided by gears 83 integral with the gears 80 which mesh with an internal gear 84 rotatable on the roll shaft 62 and held thereon by a snap ring 85. This gear train comprises the pinion 76, the gears 80 and 83, and the internal gear 84. The pinion 76 and the arm 82 are common to both gear trains providing a compact two-speed driving arrangement. When the internal gear 84 is held stationary a lower speed driving connection is established. When the internal gear 84 is free the friction in the roller bearings is sufficient to prevent rotation of the roll through this planetary gear train.

For holding either internal gear stationary, I have provided a control lever or detent 86 (see Figs. 2 and 10) which is splined on a shaft 87 rotatably carried in the ears 88 of a bracket 89 fixed to the inner wall of the ironer housing. The detent 86 has a hooked end 90 adapted to cooperate with either the notches 91 defined by teeth 92 on the gear 79 or with the notches 93 defined by teeth 94 on the gear 84 to hold one of the other gears stationary and thereby establish a driving connection to the roll. The gears 79 and 84 are provided with adjacent flanges 95 and 96 on which the end 90 of the detent member rests when the detent member is in the position intermediate the gears. While resting on the flanges 95 and 96, the detent member is obviously ineffective. The position of the detent member 86 is adjusted by an adjusting member 97 on a shaft 98 journaled in the front wall of the ironer housing. The inner end of the shaft 98 is provided with a gear 99 which meshes with a rack 100 on the detent member. The rack and pinion are so related that when the adjusting member 97 is in a horizontal position, the detent member is either positioned above the notches 91 or above the notches 93. When the adjusting member 97 is in a vertical position, the detent member is positioned above the flanges 95 and 96. The adjusting member 97 is held in the adjusted position by a spring-pressed ball detent 101 (Fig. 5). The adjusting member serves to position the detent member for cooperation with the driving gearing. The movement of the detent member into the notches 91 or 93 is controlled in a manner hereinafter described so as to establish the driving connection when the shoe is pressed against the roll and to break the driving connection when the shoe is separated from the roll. The flanges 95 and 96 are inclined, as shown in Figs. 2 and 4, so the detent can be easily moved from one of the notches 91 and 93 up on to the edges of the flanges.

The shoe is moved toward and away from the roll by a cam 102 integral with a gear 103 rotatably carried on a stub-shaft 104 fixed in the housing wall 17. The cam cooperates with a roller 105 rotatably carried in the end of an arm 106 keyed to the inner end of the shoe rock shaft 18. The roller 105 is held in contact with the cam by a coil spring 107 arranged between a seat 108 on the housing bottom wall 73 and a socket 109 in the arm. The cam is provided with depressions 110 and 111 in which the roller 105 rests at its extreme positions. When the roller rests in the depression 110, the shoe is pressed against the roll. When the roller rests in the depression 111, the shoe is moved away from the roll. The depressions center the roller with respect to the cam so that the shoe pressure arm 106 occupies the same angular position at each extreme position. The centering force which is derived from the pressure of the coil spring 107 when the shoe is away from the roll and in addition from the shoe pressure when the shoe is pressed against the roll, is sufficient to cause the necessary turning of the gear 103 so as to

bring the roller 105 into a central position in either of the depressions 110 or 111.

With this construction, the pressure applied to the shoe places a minimum amount of strain on the casing due to the closeness of the cam to the casing side wall 17. This is an important factor since the pressure applied by the cam is in the present construction three or four times as great as the pressure between the roll and the shoe.

The gear 103 meshes with a gear 112 journaled on the inner end of the roll supporting tube 59 (Fig. 4). Integral with the gear 112 is a circular flange 113 (Figs. 4 and 5) having a radial slot 114 in which is slidably carried a clutch key 115. The key is urged outward by means of a spring 116, the outward movement of the key being limited by engagement of a tongue 117 on the key with a shoulder 118. When the parts are in the position shown in the drawings, the key is held in its inner position by engagement with the end 119 of a C-shaped trip lever 121. The trip lever is loosely mounted on pins 122 fixed in bosses 123 and is resiliently held against the faces of the bosses by means of coil springs 124 (see Fig. 11). The ends 119 and 120 of the trip lever are moved out of the path of the key 115 by means of an arm 125 fixed to a shaft 126 journaled in a boss 127 in the housing bottom wall 73. A coil spring 130 (Figs. 4 and 5) keeps the lever 125 tightly seated against the upper end of the boss 127 to prevent leakage of grease around the shaft. When the shaft 126 is moved in a clockwise direction, as viewed in Fig. 11, the ends 119 and 120 of the trip lever 121 are moved toward the roll (to the left in Fig. 4) to a position out of contact with the key 115. The key 115 is then moved outward by the spring 116 into engagement with one of a plurality of notches 128 (Figs. 2 and 4) in a flange 129 integral with the continuously driven worm wheel 75, thereby completing a driving connection between the worm wheel and the gear 112. Once the driving connection is completed, the trip lever 121 is allowed to be returned to its normal position by the springs 124. The rotation of the gear 112 continues through 180° until the key 115 comes in contact with the other end 120 of the trip lever 121. This end moves the key inward and breaks the driving connection to the gear 112.

In order to insure a greater separation between the key and the notches 128, the parts are arranged so that the roll 105 is just entering one of the depressions 110 or 111 at the time the key is moved out of the notches 128 by engagement with one of the inclined surfaces 131 or 132 on the ends 119 and 120 of the trip lever. As soon as the key leaves the notches 128, rotation of the gear 112 stops, and if the key remained in this position a clicking noise would be obtained due to engagement of the key with the notches. Due to the centering action of the roller 105 in the depressions 110 and 111, the gear 103, and consequently the gear 112, is rotated a slight additional amount sufficient to cause the key to move under the flat surfaces 133 and 134 on the ends 119 and 120 of the trip lever. In these positions the key is positively moved inward to a position separated from the notches 128. The depressions 110 and 111 from one aspect insure a predetermined overtravel of the gear 112 which is sufficient to cause positive disengagement of the clutch key.

The trip lever 121 is so arranged that at the end of each 180° movement of the gear 112, the gear 103 occupies either the position shown in Fig. 5 in which the shoe is pressed against the roll or a position 180° therefrom in which the shoe is moved away from the roll. The gear 103 is held in these positions by the centering action of the roll 105 in the depressions 110 or 111.

When the ironer is used for continuous ironing, it is desirable that the rotation of the roll be started and stopped in accordance with the position of the shoe. That is, the roll should be stationary when the shoe is away from the roll and the roll should rotate when the shoe is pressed against the roll. This is effected by means of a cam 135 (see Figs. 2, 4, and 5), integral with the gear 112, which engages an arm 136 keyed on the shaft 87. The arm 136 is held against the cam 135 by means of a coil spring 137 arranged around the shaft 87 and having opposite ends bearing on the arm 136 and the bracket 89. The shape of the cam 135 is such that the hooked end 90 of the detent 86 is moved into engagement with one of the notches 91 or 93 when the shoe is pressed against the roll and is moved out of engagement with the notches when the shoe is moved away from the roll. The rotation of the roll, which is started upon engagement of the hooked end 90 with one of the notches 91 or 93, starts somewhat before the development of the full pressure between the roll and the shoe. This reduces the starting load on the roll driving mechanism.

When the ironer is used for pressing, it is desirable that the roll remain stationary when the shoe is pressed against the roll. This is effected by positioning the detent 86 above the edges of the flanges 95 and 96 by turning the adjusting lever 97 to a vertical position. The flanges hold the detent out of the notches 91 and 93 and thereby prevent the establishment of a driving connection to the roll.

The ironer is controlled by means of a knee pad 138 fixed to an arm 139 pivoted on a spindle 140 fixed to the underside of the table top (Fig. 3). The lever 138 has a pin 141 on the top thereof for receiving one of a series of notches 142 in a link 143. The notches are held in engagement with the pin by a tension spring 144 arranged between the link 143 and the spindle 140. The spring 144 also biases the link 143 to the left as viewed in Fig. 2. The right-hand end of link 143 (Fig. 11) is connected to a crank arm 145 fixed to the lower end of the shaft 126. The movement of the link 143 to the right (as viewed in Fig. 2) is limited by a stop 146 (Fig. 5) integral with the reenforcing plate 7. Movement of the knee pad 138 to the left (as viewed in Fig. 2) causes the shaft 126 to be turned in a clockwise direction (as viewed in Fig. 11), thereby moving the ends 119 and 120 of the trip lever 121 clear of the key 115 so that the spring 116 can move the key into one of the slots 128 to complete a driving connection from the worm wheel 75 to the gear 112. The position of the knee pad 138 may be adjusted by changing the notch 142 in which the pin 141 rests. As soon as the driving connection is completed, which requires only a very short interval due to the large number of slots 128 and the relatively high speed of rotation of the worm wheel 75, the knee pad 138 is released and the shaft 126 is returned to its normal position by means of the springs 124 acting on the trip lever 86 and the spring 144 acting on the link 143. When the gear 112 is rotated through 180°, the key is moved out of the slot 128 by engagement with one of the ends

119 or 120 of the trip lever 121, as described above.

The movement of the shoe toward and away from the roll may also be controlled by means of the lever 147 (Fig. 5) fixed to the shaft 126 and projecting through a slot 148 in the front wall of the spacer 8 on which the ironer housing rests. The lever 147 provides an alternative arrangement for turning the shaft 126.

In the use of the ironer, the material to be ironed is first arranged on the roll, the roll being stationary and the shoe away from the roll. The knee pad 138 is then moved to the left as viewed in Fig. 1, thereby turning the shaft 126 in a clockwise direction as viewed in Fig. 11. The arm 125 which is fixed to the shaft 126 engages the trip lever 121 and pivots it about the studs 122 until the end 120 thereof is clear of the key 115. The key is then moved outward by the spring 116 into one of the slots 128 in the worm wheel 75, completing a driving connection from the worm wheel to the gear 112. As soon as this driving connection is completed, the knee pad is released and is returned to its normal position by spring 144 acting on the link. The driving connection to the gear 112 remains completed until the gear has turned through 180°, at which time the key 115 is moved out of the slot 128 by engagement with the inclined surface 131 on the end 119 of the trip lever. After being moved out of the slot 128, the key is moved further inward by the overtravel caused by the centering action of the roller 105 in the depression 110 which causes the gear 112 to turn to a position bringing the key 115 under the flat surface 133 in which position the key is positively separated from the slots 128. This prevents any clicking of the key against the edges of the slots 128.

The 180° rotation of the gear 112 moves the gear 103 to the position shown in Fig. 5 in which the shoe is pressed against the roll.

When the gear 112 is in the position shown in Fig. 5, the cam surface 135 which is integral with the gear permits the control lever 136 to a position in which the hooked end 90 of the arm 86 is moved into one of the depressions 91 or 93 on the internal gears 79 or 84. This holds the internal gear stationary so that a driving connection is completed to the roll driving shaft 62 from the worm wheel 75 through the one or the other of the planetary gear trains which comprise respectively the pinion 76, the carrier 82, and either the internal gear 79 or the internal gear 83. The shape of the cam 97 is such that the driving connection to the roll is completed before full ironing pressure is built up between the roll and the shoe. When the roll is rotating, the ironer is adapted for ironing flat work which is fed under the shoe by the rotation of the roll.

The speed of the roll is selected by the adjusting member 97 which positions the arm relatively above the depressions 91, above the flanges 95 and 96, or above the depressions 93. When above the depressions 91, the roll is driven at its high speed. When above the flanges 95 and 96, the roll remains stationary. When above the depressions 93, the roll is driven at its low speed.

The shoe is moved away from the roll by again moving the knee pad 138 to the left, as viewed in Fig. 1. This causes the gear 103 to be turned through another 180°, in the manner described above, bringing the roller 105 into the depression 111. The depression 111 causes an overtravel similar to that caused by depression 110, sufficient to bring the clutch key under the flat surface 134 on the end 120 of the trip lever and to positively separate the key 115 from the notches 128.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an ironer, a housing, a roll supported thereby, a shoe, a driven shaft journaled in a wall in said housing having a connection for driving the roll, a gear, means including a stub shaft rotatably supporting the gear on said wall, a cam on said gear, mechanism for effecting engagement and separation of the roll and the shoe, a cam follower for actuating said mechanism, a second gear meshing with said first gear, a driving gear, said driving and second gears being concentric with and spaced along said driven shaft, and a connection between said driving and second gears for rotating said second gear.

2. In an ironer, a roll, a roll driving shaft, a shoe, a rock shaft for moving the shoe toward and away from the roll, a housing at one end of the roll having a wall adjacent the roll provided with supporting means for the roll and said shafts, a stub shaft on said wall, a gear supported thereon, cam means on the gear, a connection between said cam means and the rock shaft for effecting oscillation thereof upon rotation of the gear, roll driving mechanism carried by said roll supporting means and including a second gear meshing with said first gear, and means for selectively making and breaking a driving connection to said second gear whereby the rock shaft is oscillated.

3. In an ironer, a roll, a roll driving shaft, a shoe, a rock shaft for moving the shoe toward and away from the roll, a housing at one end of the roll having a wall adjacent the roll provided with supporting means for the roll and said shafts, a stub shaft on said wall, a gear supported thereon, cam means on the gear, a connection between said cam means and the rock shaft for effecting oscillation thereof upon rotation of the gear, roll driving mechanism on said roll driving shaft and including a second gear meshing with said first gear, and means for selectively making and breaking a driving connection to said second gear whereby the rock shaft is oscillated.

4. In an ironer, cooperating pressing members including a roll, means for driving the roll at different speeds including at least two gear trains, a control member adapted to cooperate with one or the other of the gear trains to stop and start the roll, manually operable means selectively positioning the control member for cooperation with one or the other of the gear trains, means for effecting engagement and separation of the pressing members, and means responsive to the relative position of said pressing members for operating said control member to stop and start the roll.

5. In an ironer, cooperating pressing members including a roll, means for effecting engagement and separation of said members, a roll driving shaft, a driving gear, two epicyclical gear trains driven by said driving gear for selectively driving said shaft at different speeds, said gear trains including adjacent rotatable parts each adapted when held stationary to establish a driving connection to said shaft through its respective gear train, a control member positionable to cooperate with one or the other of said parts and movable into and out of a position holding it stationary, an adjusting member for positioning said control member to co-

operate with one or the other of said parts, and means responsive to the relative position of said pressing members for effecting movement of said control member into and out of said position.

6. In an ironer, cooperating pressing members including a roll, means for effecting engagement and separation of said members, a roll driving shaft, roll driving gearing comprising a driving pinion, a carrier fixed to the roll driving shaft carrying a gear meshing with said pinion and a second gear rotatable with said first gear, internal gears meshing respectively with said first and second gears, and detent means movable into and out of a position holding one or the other of said internal gears stationary for establishing a driving connection to the roll.

7. In an ironer, cooperating pressing members including a roll, means for effecting engagement and separation of said members, a roll driving shaft, roll driving gearing comprising a driving pinion, a carrier fixed to the roll driving shaft carrying a gear meshing with said pinion, and a second gear rotatable with said first gear, internal gears meshing respectively with said first and second gears, detent means positionable to cooperate with one or the other of said internal gears and movable into and out of a position holding it stationary to establish a driving connection to the roll, an adjusting member for positioning said detent means to cooperate with one or the other of said internal gears, and means responsive to the relative position of said pressing members for effecting movement of said detent means into and out of said position.

8. In an ironer, cooperating pressing members including a roll, means for effecting engagement and separation of said members, roll driving gearing comprising two epicyclical gear trains having adjacent rotatable members adapted when held stationary to establish a driving connection to the roll driving shaft through its respective gear train, a detent member positionable to cooperate with one or the other of said rotatable members and movable into and out of a position holding it stationary, adjusting means for positioning said detent member to cooperate with one or the other of said rotatable members, and means responsive to the relative position of the pressing members for effecting movement of said detent member into and out of said position.

9. In an ironer, cooperating pressing members including a roll, means for effecting engagement and separation of said members, a roll driving shaft, roll driving gearing comprising two epicyclic gear trains having adjacent rotatable members adapted when held stationary to establish a driving connection to the roll driving shaft through its respective gear train, a detent member positionable over one or the other of its rotatable members and in a position intermediate said members, said detent member while positioned over one or the other of said rotatable members being movable into and out of a position holding it stationary, means for preventing operation of said detent member while in the intermediate position, an adjusting member for positioning the detent member, and means responsive to the relative position of the pressing members for effecting movement of said detent members into and out of said position.

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