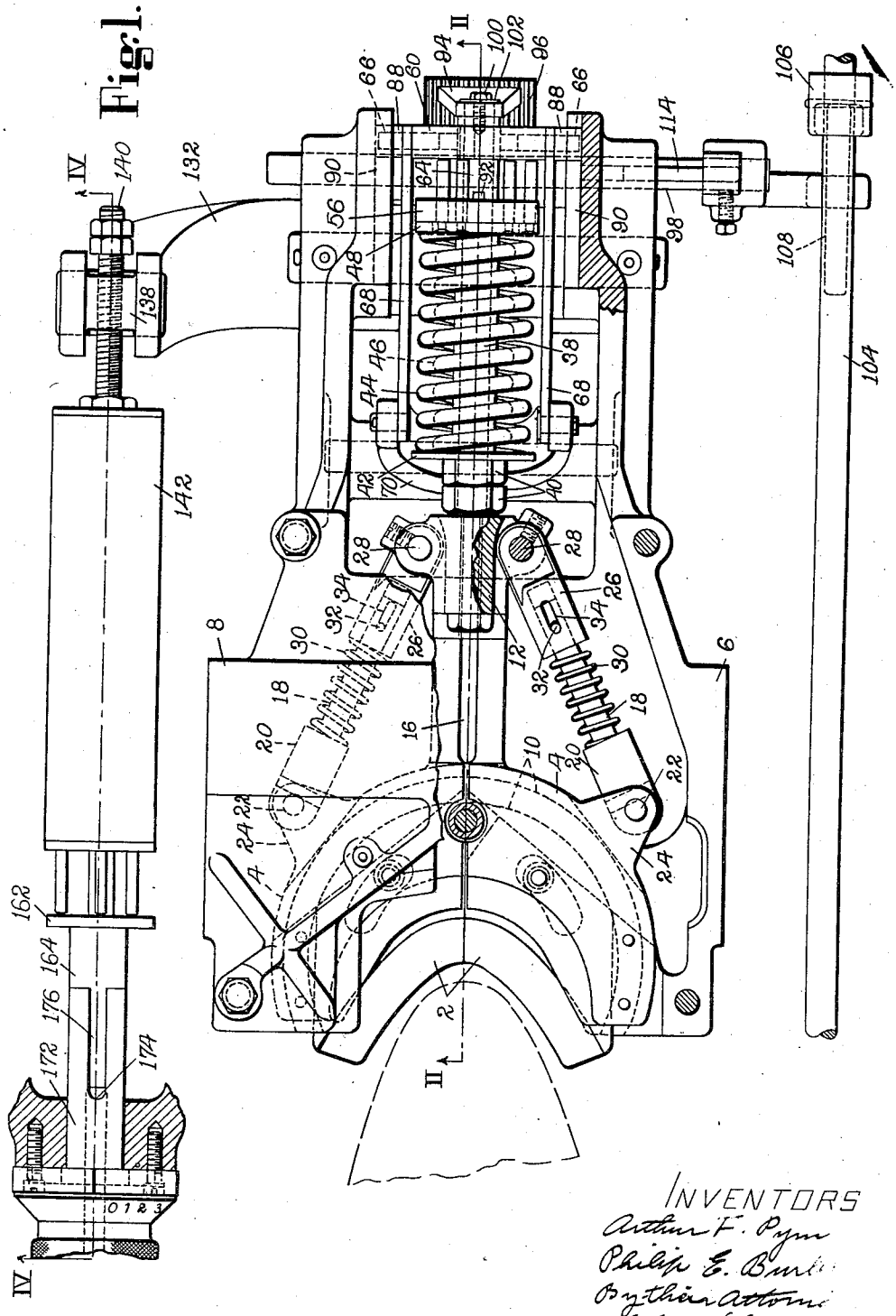
Jan. 10, 1939. A. F. PYM ET AL 2,143,030

SPRING MECHANISM

Filed Nov. 15, 1937 4 Sheets-Sheet 1

Fig. 1.



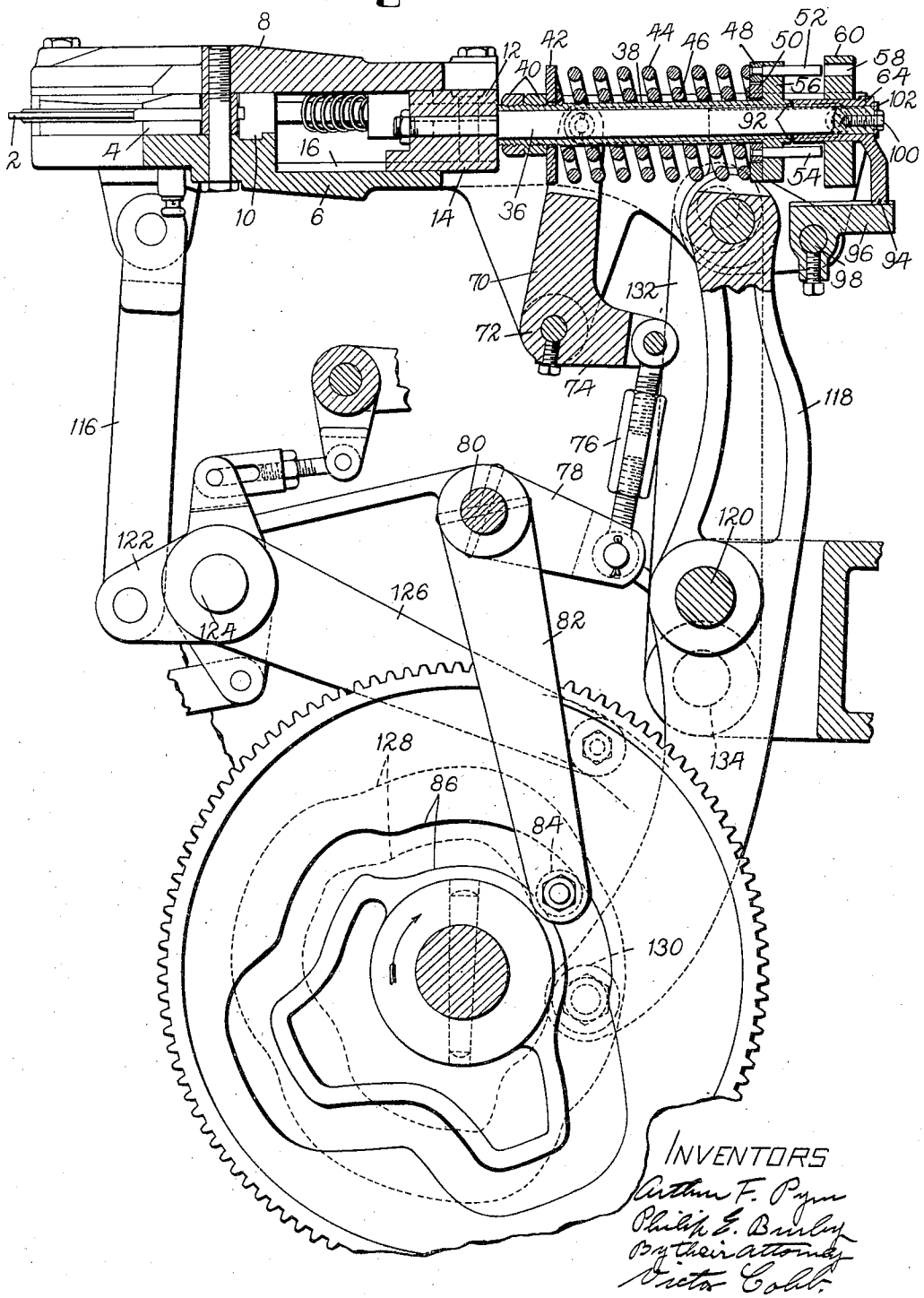
INVENTORS
Arthur F. Pym
Philip E. Burch
By Cothran Attorneys
Victor Cobb

Jan. 10, 1939. A. F. PYM ET AL 2,143,030

SPRING MECHANISM

Filed Nov. 15, 1937 4 Sheets-Sheet 2

Fig. 2.



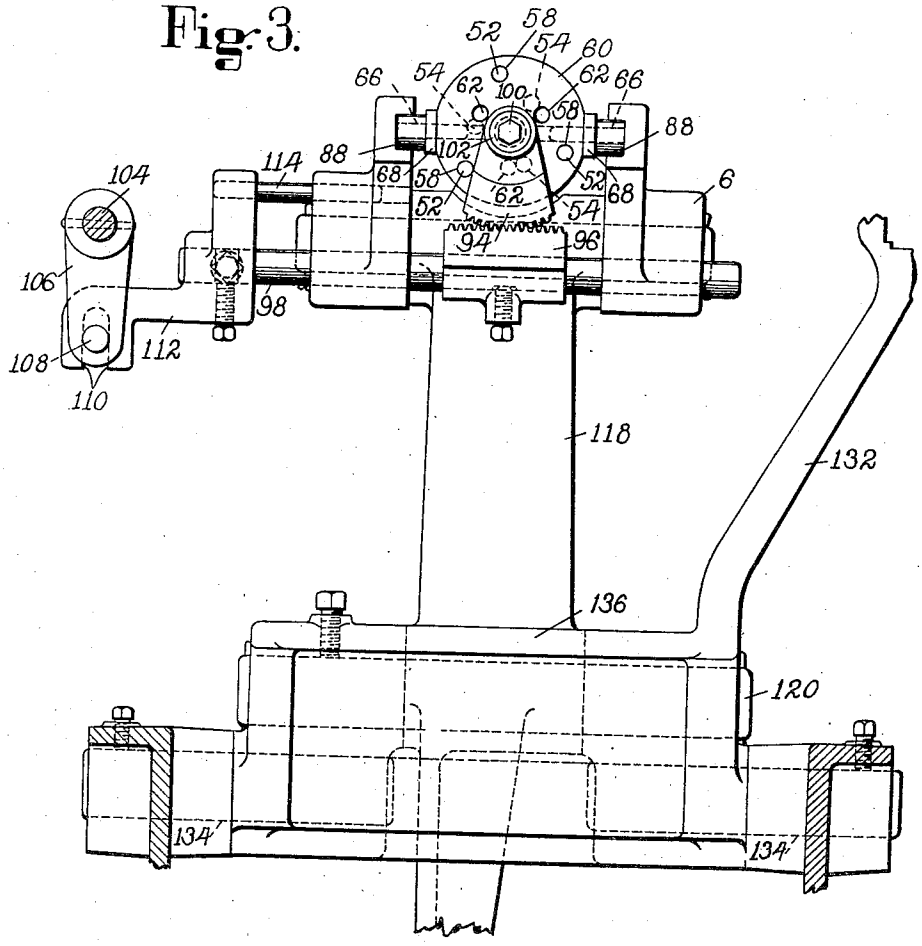
INVENTORS
Arthur F. Pym
Philip E. Burley
By their attorney
Victor Cobb

Jan. 10, 1939. A. F. PYM ET AL 2,143,030

SPRING MECHANISM

Filed Nov. 15, 1937 4 Sheets-Sheet 3

Fig. 3.



INVENTORS
Arthur F. Pym
Philip E. Burley
By their attorney
Victor Cobb

Jan. 10, 1939. A. F. PYM ET AL 2,143,030

SPRING MECHANISM

Filed Nov. 15, 1937 4 Sheets-Sheet 4

Fig. 4.

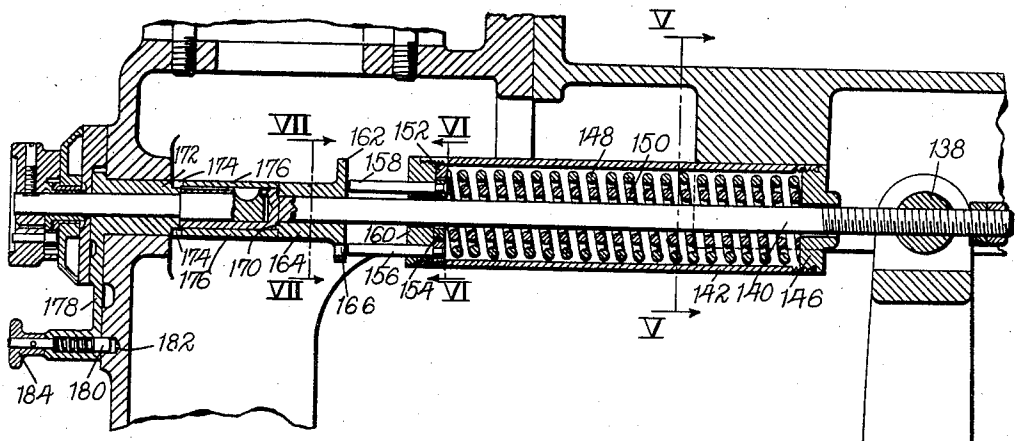


Fig. 6.

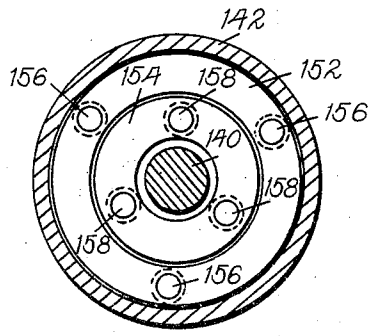


Fig. 5.

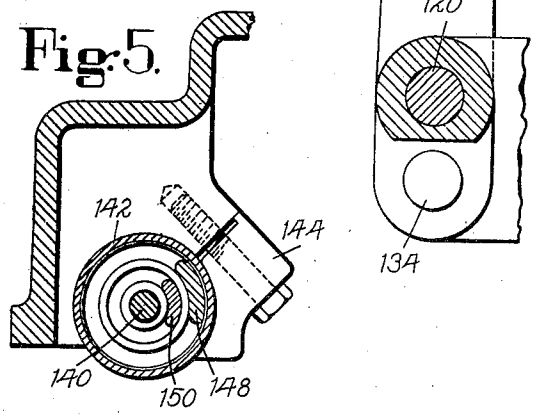
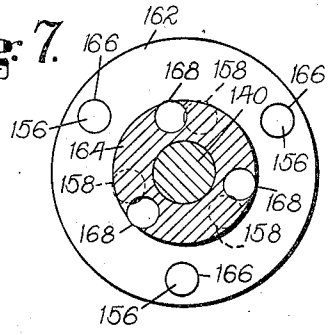


Fig. 7.



INVENTORS
Arthur F. Pym
Philip E. Burley
By their attorney
Victor Cobb

Patented Jan. 10, 1939 2,143,030

UNITED STATES PATENT OFFICE

2,143,030

SPRING MECHANISM

Arthur F. Pym, Swampscott, and Philip E. Burby, Beverly, Mass., assignors to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Application November 15, 1937, Serial No. 174,566

15 Claims. (Cl. 267—1)

This invention relates to spring mechanism for transmitting power or resisting movement yieldingly with variable force, and is herein illustrated as applied to means for operating and controlling toe-lasting wipers in a lasting machine of the character disclosed in a copending application of F. C. Eastman and A. F. Pym, Serial No. 169,820, filed on October 19, 1937. It is to be understood, however, that the invention is not limited to lasting machines, but is adapted for various uses.

An object of the invention is to provide spring mechanism the effective force of which may be readily and quickly varied to meet different conditions in the use of such mechanism. For the purpose in view, the construction herein shown comprises novel means for selectively utilizing, for power transmission or resistance, a plurality of springs of different strengths. More particularly, in the illustrated embodiment of the invention, there are provided two concentric coil springs, one stronger than the other, and means for rendering either of the springs effective while the other is idle or for utilizing the forces of both springs combined. The springs, as shown, are arranged to be compressed by a member engaging different sets of pins associated respectively with the different springs, this member being provided with two corresponding sets of openings so arranged that under certain conditions of adjustment one set of such openings will register with and receive the corresponding pins to render one of the springs idle and under other conditions of adjustment the other set of openings will register with and receive the pins which correspond thereto and thus render the other spring idle. When the parts are in still another adjusted relation none of the openings will register with any of the pins and accordingly both the springs will be utilized.

The novel features of the invention, including various novel details of construction and combinations of parts, will now be more particularly described with reference to the accompanying drawings and thereafter pointed out in the claims.

In the drawings,

Fig. 1 is a plan view, with parts broken away, showing a portion of the machine disclosed in the previously mentioned application with novel features of the present invention embodied therein;

Fig. 2 shows a portion of the machine partly in right-hand side elevation and partly in section on the line II—II of Fig. 1;

Fig. 3 is a view in rear elevation of a portion of the structure shown in Figs. 1 and 2;

Fig. 4 is a section on the line IV—IV of Fig. 1;

Fig. 5 is a section on the line V—V of Fig. 4;

Fig. 6 is a section on the line VI—VI of Fig. 4; and

Fig. 7 is a section on the line VII—VII of Fig. 4.

In view of the disclosure in the previously mentioned application, only such parts of the machine as it is necessary to refer to for an understanding of the invention will be hereinafter described. For lasting the toe end of a shoe supported bottom upward in a position indicated diagrammatically in Fig. 1, the machine is provided with a pair of wipers 2 having curved wiping edges which embrace the shoe upper around the toe end of the last and wipe the upper upwardly to the edge of an insole on the last and thereafter wipe the marginal portion of the upper inwardly over the insole. These wipers are secured to wiper holders 4 which are supported on a wiper carrier 6 under a cover plate 8 on the carrier and by means of tongue-and-groove connections 10 with the carrier are guided for swinging or closing movements with the wipers laterally of the shoe about a vertical axis located at the meeting point of the wiping edges of the wipers. Such closing movements are imparted to the wiper holders 4 through link connections with a slide 12 movable in directions lengthwise of the shoe along the wiper carrier 6 and provided with a tongue 14 (Fig. 2) mounted in a guideway 16 on the carrier. Each of the link connections comprises a rod 18 having a head 20 pivotally connected by a pin 22 to an ear 24 on the corresponding wiper holder 4, the rod being slidingly mounted in a socket formed in a member 26 pivotally connected by a pin 28 to the slide 12. Between the head 20 and the member 26 is a comparatively light spring 30 arranged to yield as the wiper is pressed against the side of the toe before the wipers in their upward movement arrive in position to wipe the upper inwardly over the insole. The rod 18 carries a pin 32 mounted in a slot 34 in the member 26 to limit the yield of the spring 30, so that before the completion of the operation of wiping the upper inwardly over the insole the member 26 acts positively on the rod 18.

For operating the slide 12 to impart the closing movements to the wiper holders and wipers there is provided a rod 36 (Fig. 2) the front end of which, i. e., the left-hand end in Fig. 2, is reduced in diameter and secured to the slide, and mounted on this rod with its front end in abutting

relation to the slide is a sleeve 38 having nuts 40 threaded thereon to provide an abutment for a washer 42. This washer is engaged by the front ends of two coil springs 44 and 46, of which the spring 46 is the stronger and is located within the spring 44, the springs abutting respectively at their rear ends against rings 48 and 50. Secured to the ring 48 is a set of three pins 52 (see Fig. 3) and secured to the ring 50 is a set of three pins 54, all these pins extending rearwardly lengthwise of the springs through holes in a flange 56 integral with the sleeve 38 at the rear end of the sleeve and being slidingly movable in these holes. The pins 52 are arranged to register or aline with a corresponding set of holes 58 in a disk 60 located opposite the rear ends of the pins when this disk and the sleeve 38 are in a certain relation with respect to relative turning movement about the rod 36, i. e., the relation illustrated in the drawings, and the pins 54 are arranged to register or aline with another set of holes 62 in the disk when the disk and the sleeve are in another adjusted relation, the pins 52 being then out of alinement with the holes 58. When the disk and the sleeve are in still another adjusted relation both sets of pins 52 and 54 are out of alinement with the corresponding holes in the disk. Accordingly, by forward movement of the disk 60, i. e., movement toward the left in Fig. 2, the wiper-closing slide 12 will be operated through either of the springs 44 or 46 alone, or through both springs combined, depending upon the adjustment, since the disk will abut against and act on any pins not in alinement with holes therein and will be ineffective on any pins in alinement with such holes because they will enter the holes. The wipers therefore will be closed with different degrees of force, as may be desirable in operating upon different kinds of upper materials. It will be evident that either of the rings 48 or 50 with its pins serves as a device for transmitting force from the disk 60 to the corresponding spring.

The disk 60 is slidingly mounted on a sleeve 64 mounted on the rear end of the rod 36 and is connected by pins 66 (Figs. 1 and 3) to a pair of links 68 which are pivotally connected at their front ends to the bifurcated upper end of an upwardly extending arm 70 of a bell-crank lever 72 pivotally mounted on the wiper carrier 6. The bell-crank lever 72 has a rearwardly extending arm 74 connected by a link 76 to an arm 78 fast on a rock shaft 80 mounted in bearings in the frame, and also fast on this rock shaft is an arm 82 provided at its lower end with a roll 84 lying in a cam track 86 which operates the arm 82 to close the wipers, as more fully disclosed in the previously mentioned application.

The pins 66 which connect the disk 60 to the links 68 carry rolls 88 which are movable along guideways 90 (Fig. 1) in the wiper carrier 6 to assist in supporting the rod 36 and the parts thereon. The disk 60, therefore, is prevented from turning, and the adjustment for rendering either or both the springs 44, 46 effective in the wiper-closing operation is made by turning the sleeve 38 and the parts thereon, including the two springs and their associated rings 48 and 50 and pins 52 and 54, to vary the relation of the pins to the holes in the disk. For this purpose the sleeve 38 has on its rear end two lugs 92 (Fig. 2) which extend into recesses in the sleeve 64 to lock the two sleeves together, and integral with the sleeve 64 is a gear sector 94 in engagement with a rack bar 96 (Fig. 3) fast on a rod 98 which is slidingly mounted in bearings in the wiper carrier 6. The sleeve 64 is held on the rod 36 by a screw 100 and a washer 102. The rod 98 is moved lengthwise to effect the required adjustment by means of a rock shaft 104 arranged to be operated manually by means disclosed in the previously mentioned application, this rock shaft being provided with a crank arm 106 which carries a pin 108 lying in a slot 110 formed in an arm 112 fast on the rod 98. A pin 114 fast in the hub of the arm 112 is slidingly movable in a hole in the wiper carrier 6 to prevent the rod 98 from turning.

In the toe-lasting operation it is necessary not only to close the wipers laterally of the shoe as above described, but also to advance them bodily lengthwise of the shoe, such bodily movement of the wipers being effected by forward movement of the wiper carrier 6, i. e., movement of the carrier toward the left in Fig. 2. For this purpose the wiper carrier is supported at its forward end on a pair of swinging links 116, only one of which is shown in the drawings, and near its rear end on the upper end of a lever 118 which is mounted substantially midway between its upper and lower ends on a fulcrum rod 120 supported as hereinafter described. The upper arm of the lever 118 thus constitutes, in effect, a link substantially parallel to the links 116. The links 116 are pivotally connected at their lower ends to arms 122 fast on a rock shaft 124 controlled by a cam-operated lever 126 through which upward and downward movements are imparted to the wipers by swinging the wiper carrier about its connection with the lever 118. To advance the wiper carrier and the wipers lengthwise of the shoe the lever 118 is operated by a cam track 128 in which lies a roll 130 carried by the lower end of the lever.

To provide for yield in the advance of the wipers lengthwise of the shoe, corresponding to the above-described yield in the closing of the wipers, the fulcrum rod 120 on which the lever 118 is mounted is supported by a lever 132 which is mounted at its lower end to swing in directions lengthwise of the shoe on two short rods 134 supported by the frame and located below the rod 120, the lever 132 being provided with a web 136 (Fig. 3) which connects two spaced hub portions thereof at opposite sides of the lever 118. The lever 132 is controlled by spring mechanism constructed in accordance with the present invention and generally similar to the spring mechanism hereinabove described through which the closing of the wipers is effected. Mounted to turn in the forked upper end of the lever 132 is a pin 138 (Figs. 1 and 4) in which is threaded the rear end of a rod 140 extending forwardly through a cylindrical casing 142. This casing is fastened rigidly to the frame of the machine by a clamp member 144 (Fig. 5) and has fast in its rear end a head 146 through which the rod 140 loosely extends. This head serves as a fixed abutment for the rear ends of a pair of coil springs 148 and 150 in the casing 142, the spring 150 being stronger than the spring 148 and located within the latter. At their forward ends these springs abut respectively against two rings 152 and 154 (Figs. 4 and 6). Fast on the ring 152 is a set of three pins 156 and fast on the ring 154 is a set of three pins 158, all these pins extending forwardly through holes in a head 160 fast in the forward end of the casing 142. In front of the pins is a disk 162 formed integral with a sleeve 164 mounted on the rod 140, the disk having therein a set of three holes 166 (Fig. 7) arranged to aline with the pins 156 when the disk is in one position with respect to turning

movement about the rod 140, and the disk and its sleeve 164 being provided with a set of three holes 168 arranged to aline with the set of pins 158 when the disk is turned to another position, the holes 166 being then out of alinement with the pins 156. When the disk is in still another position all the holes are out of alinement with the pins. It will thus be seen that any rearward movement of the disk 162 and its sleeve 164 will be yieldingly resisted by one or the other or both of the two springs 148, 150, depending upon the adjusted position of the disk. At its forward end the rod 140 is enlarged and bears against a shoulder 170 on the sleeve 164, and accordingly the disk and sleeve will be moved rearwardly by any movement of the rod 140 in that direction. The rod will be moved in that manner in response to resistance of the shoe to the bodily advancing movement of the wipers when that resistance becomes great enough to overcome the resistance of the spring or springs controlling the disk and sleeve. That is, under those conditions the lever 118 will be swung by the cam track 128 about its connection with the wiper carrier 6, carrying the fulcrum rod 120, about which it normally swings, toward the rear while swinging the lever 132 in that direction to exert a rearward pull on the rod 140. Convenient means is thus provided to cause the wipers to press yieldingly on the upper lengthwise of the shoe with an amount of force which may be varied in accordance with the character of the upper materials.

For adjusting the disk 162 and sleeve 164 there is provided a cylindrical member 172 mounted to turn in a bearing in the frame and having a rearwardly extending sleeve portion (Fig. 1) arranged to fit over the enlarged front end portion of the rod 140 and provided with two slots 174 (see also Fig. 4) to receive fingers 176 extending forwardly from the sleeve 164. Accordingly, the disk 162 and sleeve 164 are turned by turning movement of the member 172, the interlocking connection between this member and the sleeve permitting the sleeve and disk to move rearwardly with the rod 140 in the manner previously described. Integral with the member 172 is a crank arm 178 for turning it, this crank arm carrying a spring-pressed pin 180 arranged to enter any one of three holes 182 in the frame (only one of which is shown) to maintain the parts in adjusted positions. A knob 184 on the pin 180 provides means for withdrawing the pin from any one of the holes and for swinging the crank arm 178. With the parts adjusted as shown in the drawings, only the spring 150 will be compressed by movement of the disk 162 and sleeve 164 resulting from resistance of the shoe to the forward movement of the wipers, the spring 148 remaining idle since the pins 156 will enter the holes 166 in the disk. When the disk and sleeve are adjusted to a second position only the spring 148 will be compressed, because the pins 158 will enter the holes 168, and when they are adjusted to a third position both springs will be compressed because all the pins will be out of alinement with the holes in the disk and sleeve.

It will be understood that while the invention is herein illustrated as embodied, in each instance, in a construction in which only two springs are utilized, the invention is not limited to that number of springs.

Having described the invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. In spring mechanism, the combination with a movable member, of a pair of springs of different strengths arranged to be subjected to stress by movement of said member in one direction, and means adjustable to render either of said springs idle while the other is thus subjected to stress.

2. In spring mechanism, the combination with a movable member, of a pair of springs of different strengths arranged to be subjected to stress by movement of said member in one direction, and means adjustable to render said member in its movement thus effective on both the springs combined or on either of them selectively while the other is idle.

3. In spring mechanism, the combination with a movable member, of a pair of coil springs of different strengths located one within the other and arranged to be compressed by movement of said member in one direction, and means adjustable to render said member in its movement thus effective to compress either of the springs alone.

4. In spring mechanism, the combination with a movable member, of a pair of springs of different strengths arranged to be subjected to stress by movement of said member in one direction, devices associated respectively with the different springs to cause them thus to be subjected to stress when said member is moved, and means arranged to act on said devices to render them effective on the springs, said means and devices being relatively adjustable to render either of the devices ineffective and thus to render either of the springs idle when the other is subjected to stress.

5. In spring mechanism, the combination with a movable member, of a pair of springs of different strengths arranged to be subjected to stress by movement of said member in one direction, devices associated respectively with the different springs to cause them thus to be subjected to stress when said member is moved, and means arranged to act on said devices to render them effective on the springs, said means and devices being relatively adjustable to render both devices or either of them alone thus effective.

6. In spring mechanism, the combination with a movable member, of a pair of springs of different strengths arranged to be subjected to stress by movement of said member in one direction, devices associated respectively with the different springs to cause them thus to be subjected to stress when said member is moved, and means arranged to abut against said devices to render them effective on the springs, said means and devices being relatively adjustable to cause said means to clear either of the devices selectively and thus to render either of the springs idle when the other is subjected to stress.

7. In spring mechanism, the combination with a movable member, of a pair of springs of different strengths arranged to be subjected to stress by movement of said member in one direction, pins associated respectively with the different springs to cause them thus to be subjected to stress when said member is moved, and a device arranged to abut against said pins to render them effective on the springs, said device and the pins being relatively adjustable to cause different pins selectively to clear the device and thereby render either of the springs idle when the other is subjected to stress.

8. In spring mechanism, the combination with a movable member, of a pair of springs of different strengths arranged to be subjected to stress by movement of said member in one direction, pins associated respectively with the different

springs to cause them thus to be subjected to stress when said member is moved, and a device arranged to abut against said pins to render them effective on the springs and provided with a plurality of openings arranged to register with and receive different pins selectively when the device and the pins are in different adjusted relations to render either of the springs idle when the other is subjected to stress, said device and the pins being also relatively adjustable to cause the device to abut against all the pins and thus subject both springs to stress.

9. In spring mechanism, the combination with a movable member, of a pair of coil springs of different strengths located one within the other and arranged to be compressed by movement of said member in one direction, devices associated respectively with the different springs to cause them thus to be compressed when said member is moved, and means arranged to abut against said devices to render them effective on the springs, said means and devices being relatively adjustable about an axis extending lengthwise of the springs to cause said means to clear either of the devices selectively and thus to render either of the springs idle when the other is compressed.

10. In spring mechanism, the combination with a movable member, of a pair of coil springs of different strengths located one within the other and arranged to be compressed by movement of said member in one direction, pins associated respectively with the different springs to cause them thus to be compressed when said member is moved, a device arranged to abut against said pins to render them effective on the springs and provided with a plurality of openings arranged to register with and receive different pins selectively when the device and the pins are in different adjusted relations to render either of the springs idle when the other is compressed, and means for positioning said device and the pins in such different relations by relative movement about an axis extending lengthwise of the springs.

11. In spring mechanism, the combination with a movable member, of a pair of coil springs of different strengths located one within the other and arranged to be compressed by movement of said member in one direction, rings arranged to abut respectively against the different springs and each provided with a set of pins extending therefrom lengthwise of the springs, a device arranged to abut against said pins to cause the springs to be compressed by the movement of said member, said device being provided with different sets of openings arranged respectively to register with and receive the different sets of pins when the device and the pins are in different adjusted relations to render either of the springs idle when the other is compressed, and means for positioning said device and the pins in either of said adjusted relations by relative movement about an axis extending lengthwise of the springs and also in a third adjusted relation to cause the device to abut against all the pins for compressing both springs combined.

12. In spring mechanism, a pair of coil springs located one within the other, members relatively movable to compress said springs between them, devices associated respectively with the different springs and each arranged to transmit force from one of said members to one of the springs, and means for selectively rendering either of said devices inoperative and thereby rendering either spring idle when the other is compressed.

13. In spring mechanism, a pair of coil springs located one within the other, members relatively movable to compress said springs between them, devices associated respectively with the different springs and each comprising a set of pins extending lengthwise of the springs for transmitting force from one of said members to one of the springs, and means arranged to afford clearance for either of the sets of pins selectively to prevent the compression of either spring when the other is compressed.

14. In spring mechanism, a pair of coil springs located one within the other, members relatively movable to compress said springs between them, devices associated respectively with the different springs and each comprising a set of pins extending lengthwise of the springs, one of said members being arranged to abut against said pins to effect compression of the springs and having therein openings arranged to register with and receive the different sets of pins selectively when said member and the pins are in different adjusted relations to render either of the springs idle when the other is compressed, and means for positioning said member and the pins in such different relations by relative movement about an axis extending lengthwise of the springs.

15. In spring mechanism, a pair of coil springs located one within the other, members relatively movable to compress both said springs between them, and means for rendering one of the springs idle when the other is compressed, said means comprising pins extending lengthwise of the springs and arranged to transmit force to one spring from one of said members but to enter openings in that member to prevent such transmission of force when said member and the pins are in one adjusted relation.

ARTHUR F. PYM.
PHILIP E. BURBY.