

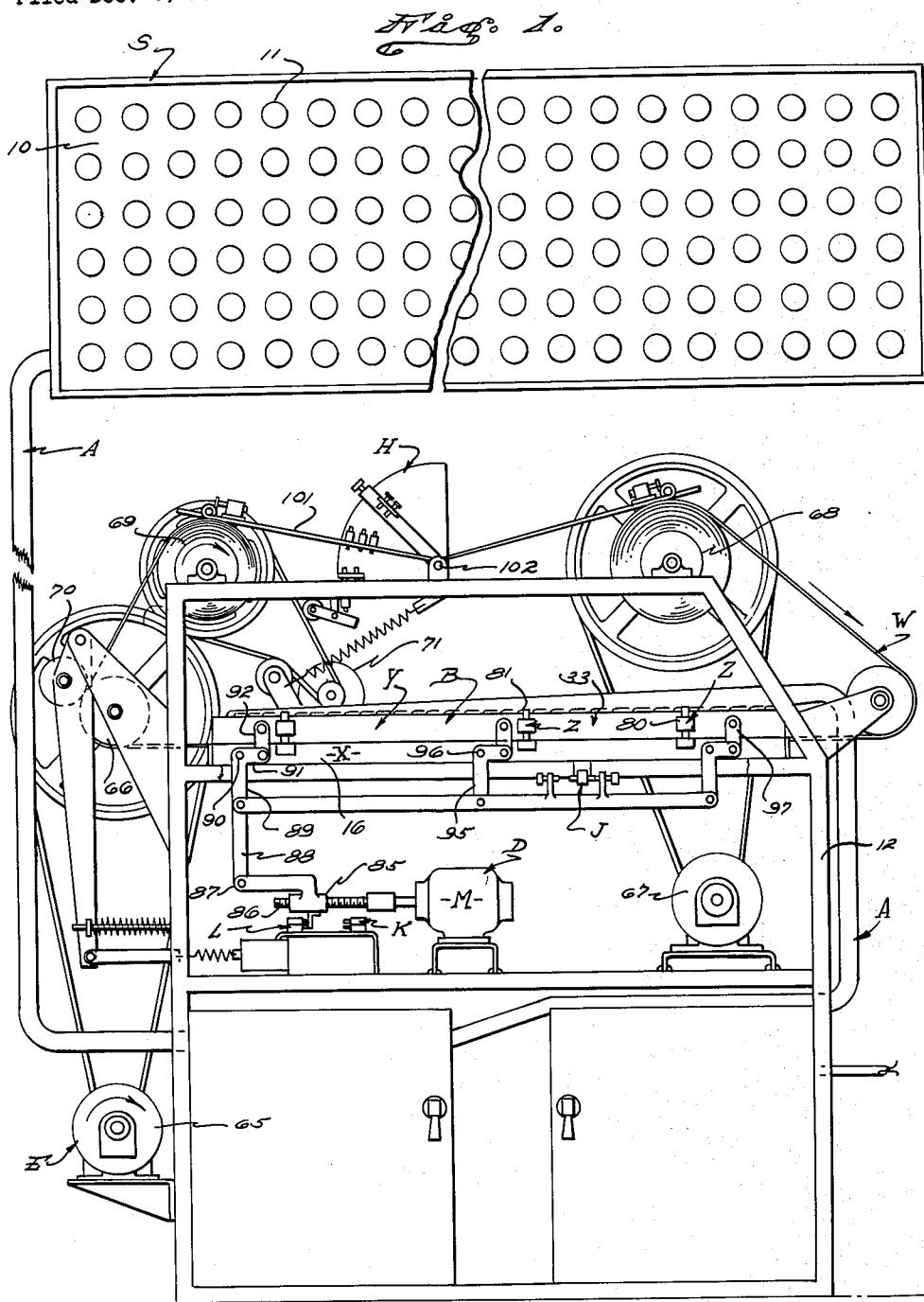
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W. M. PORTER ET AL
ELECTRIC CONTROL MECHANISM

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4 Sheets-Sheet 1



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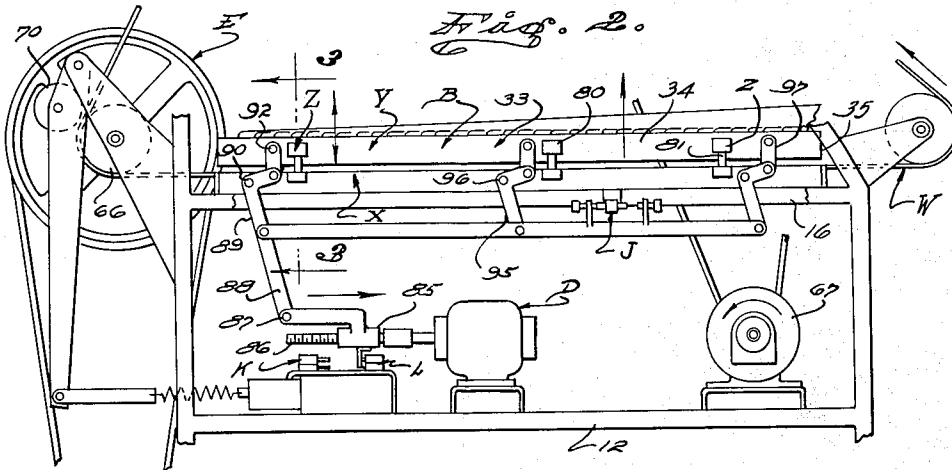
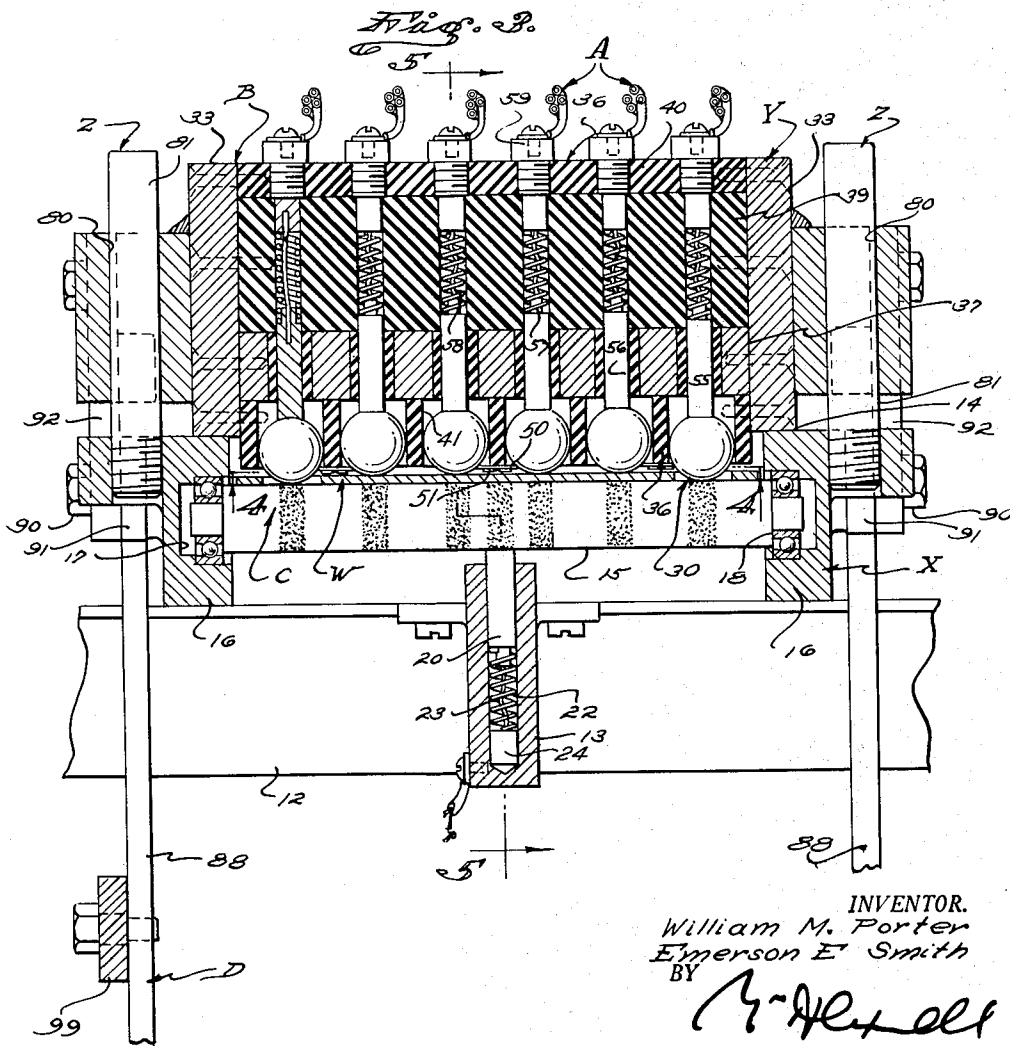
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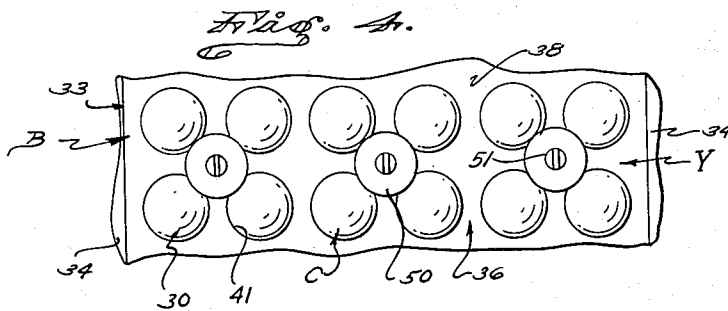
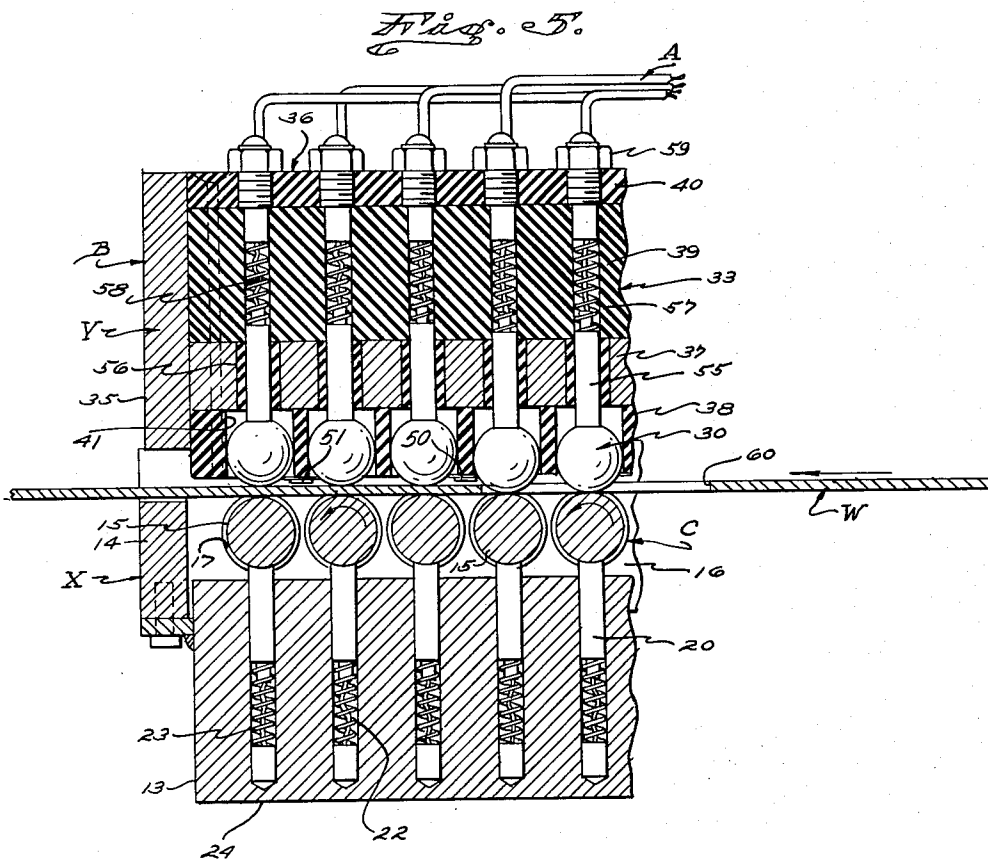
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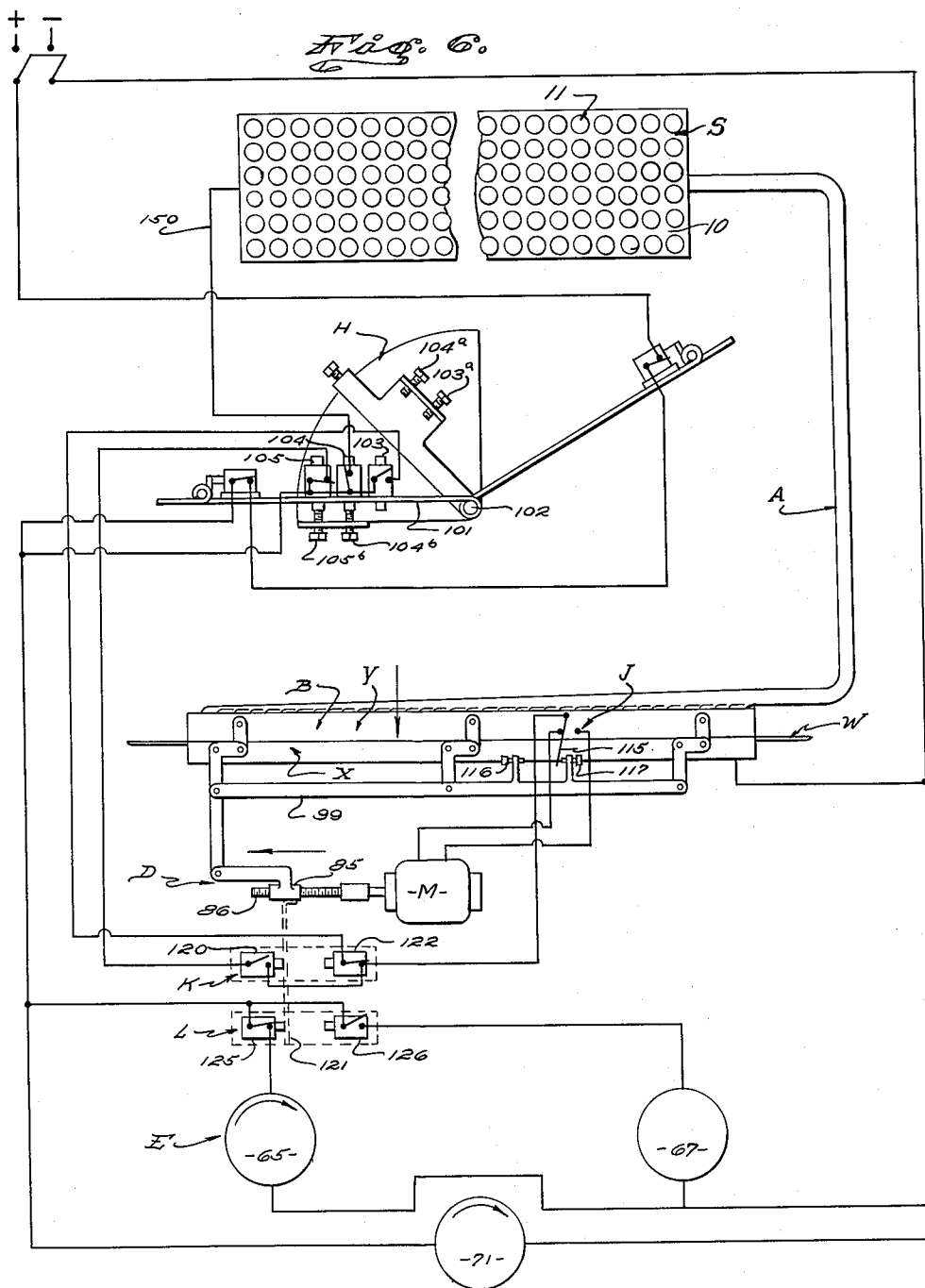
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ELECTRIC CONTROL MECHANISM

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6 Claims. (Cl. 200—46)

This invention has to do with an electric control mechanism and it is a general object of the invention to provide a simple, practical, inexpensive control mechanism suitable for the control of electric signs, or the like.

There are many situations where an electric sign is desired wherein the sign involves a multiplicity of lamps, or light units, which are suitably controlled or turned off and on to gain the desired result. The usual so-called blinker mechanisms applied to such situations are not altogether satisfactory and are generally complicated, and where attempts are made to provide such mechanisms controlled by webs, or the like, great difficulties are experienced and it is usually necessary to employ a multiplicity of relays so that the initially controlled circuits may be of low voltage to avoid arcing, while the power circuits to the lamps of the sign are of higher voltage suitable for the operation of ordinary electric lamps, or the like.

The present invention is characterized by a contact mechanism involving a plurality of contacting units under control of a web, or the like. The contact mechanism is releasable or subject to operation to free the web for rewinding so that the contacting units are not operated as the web is rewound. In its preferred form the contacting mechanism involves relatively movable sections each of which carries contacts, preferably metal contacts that cooperate through openings in the web. A feature of the invention is the provision of brushes of carbon, or the like, that cooperate with metal contacts and act therewith to provide a structure that operates to provide efficient dependable electrical connections without pitting or burning of the contacts. The invention further provides a reversible drive that operates the web, and in its preferred form the drive involves a feed motor that feeds the web through the contact mechanism and a re-wind motor that operates the web onto a supply drum while the contact mechanism is released or opened allowing the web to operate free thereof. The invention further provides an actuator for the contact mechanism that acts to effect relative movement between the sections of the contact mechanism so that they are together or in cooperative relationship as the web is fed, and are open or out of cooperative relationship as the web is rewound. Further, the invention provides a control system for the reversible drive of the web and for the actuator of the contact mechanism whereby these elements are responsive to or under general control of the web and act in the desired synchronism so that the machine operates continuously to feed the web through the contact mechanism and then rewind the web free of the contact mechanism and thereafter again feed the web through the contact mechanism, etc.

A general object of the present invention is to provide an electric control mechanism of the general character referred to wherein simple, dependable, and efficient contacting units are provided to be controlled by a web or the like, which units are characterized by cooperating contacts of metal, or the like, surfaced with a material such as carbon, or the like, which protects the contacts against

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pitting and which makes for highly efficient electrical connections when the contacts are closed or together.

Another object of the invention is to provide a control mechanism of the general character referred to wherein the contacting units are characterized by cooperating contacts which rotate or operate, and wherein a contact is engaged by a carbon brush, or the like, so that as the contact operates carbon from the brush is deposited on the contact to provide an effective surfacing thereon.

Another object of the invention is to provide a simplified, improved, highly effective contact mechanism characterized by relatively movable sections, for instance, a stationary base section and a shiftable head section, which sections are of simple, practical, inexpensive construction and carry a multiplicity of contacts so that they operate uniformly and dependably under control of a web that acts between the sections.

Another object of the invention is to provide an actuator for a contact mechanism of the general character referred to which actuator operates to move or shift the head section of the mechanism between an operating position which prevails while the web is being fed through the mechanism, and a released position which prevails while the web is being rewound. Through the structure of the present invention the web is confined between the sections as it is fed so that the contacting units are effectively controlled by the web, while during rewinding of the web it is free to operate through or between the sections of the mechanism without interference or friction, all to the end that the rewinding may be performed rapidly and without appreciable wear or tear upon the mechanism, and particularly upon the control web.

It is another object of the invention to provide a control mechanism of the general character referred to involving a sectional contact mechanism, a reversible drive handling a control web, an actuator operating the contact mechanism, and a control system responsive to the web and serving to effectively synchronize or time the operation of the reversible drive and also the actuator, so that the various elements of the machine are properly timed and cooperate in the desired manner.

The various objects and features of our invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a side elevation of a machine embodying the present invention showing the electric control mechanism of the present invention combined with or related to a sign involving a plurality of lamps or the like, the mechanism serving to control the action of said lamps. Fig. 2 is a view of a portion of the structure shown in Fig. 1 and particularly the contact mechanism involved in the structure shown in Fig. 1 combined with the actuator therefor, the parts in Fig. 2 being shown in a position opposite to that illustrated in Fig. 1. Fig. 3 is an enlarged detailed transverse sectional view of the structure shown in Fig. 1, being a view taken as indicated by line 3—3 on Fig. 2, the sections of the contact mechanism being shown in operating relationship which is the position of parts illustrated in Fig. 1. Fig. 4 is a view of a portion of the mechanism taken as indicated by line 4—4 on Fig. 3. Fig. 5 is a longitudinal sectional view of a portion of the mechanism shown in Fig. 3, being a view taken as indicated by line 5—5 on Fig. 3, and Fig. 6 is a simplified wiring diagram illustrating a system of wiring or electrical connections that may be employed in carrying out the invention.

The electrical control mechanism of the present invention may be employed as a control for various devices or elements and it is particularly practical for use in situations where a multiplicity of electrical units are to be

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controlled, for instance, turned off and on at suitable intervals, and where it is desired to employ ordinary, commonly available current without resort to complicated relay systems. An example of a typical application of the invention is an electric sign S wherein there may be a display board or the like 10, carrying a plurality of lighting units or lamp bulbs 11. It will be understood that the several light units 11 of the sign S may be connected with the control mechanism of the present invention through a multiple strand cable A so that the control mechanism controls the individual lamp units or groups thereof, as may be desired.

The control mechanism embodying the present invention involves, generally, a contact mechanism B which includes or incorporates a multiplicity of contacting units C which control circuits are handled by the cable A, to the end that the contacting units control the units 11 of sign S. In accordance with the invention the contact mechanism B handles or carries a control web W so that the web controls the action of the contacting units C and in accordance with the invention the contact mechanism normally confines the web to cooperate with the contacting units C during feeding of the web and releases the web to be operable without reference to the contacting units as the web is rewound. Structurally the contact mechanism is characterized by relatively movable sections, for instance, a stationary base section X and a shiftable head section Y, and a guide means Z is provided to guide the head section Y in its movement relative to the base section X.

The invention provides an actuator D for the contact mechanism B which actuator serves to shift the head section Y relative to the base section X. The invention provides a reversible drive E for the web, which drive serves to feed the web through the contact mechanism when the mechanism is in operating position; and serves to retract or rewind the web when the contact mechanism is in the released position.

In addition to the general elements above named the invention provides a control system, one form of which is illustrated diagrammatically in Fig. 6 of the drawings; which system is responsive to or under control of the web W and serves to control the reversing drive for the web and also to control the actuator D, all as will be hereinafter described.

The contact mechanism B which carries the multiplicity of contacting units C and which handles the web W so that it controls the units C, is preferably carried by a suitable frame 12, and in the preferred arrangement the base section X of mechanism B is mounted in the frame 12 to be stationary. In the case illustrated the base section X of mechanism B is an elongated flat horizontally disposed element or body and it is preferably characterized by an assembly of parts including a bottom 13 and parallel upstanding sides 14 that project upwardly from opposite end edges of the bottom. The base section X carries the lower contacts 15 of the contacting units C and in the preferred form of the invention the lower contacts 15 are in the form of rollers mounted to extend transversely of the base section X to be suitably spaced apart longitudinally of the base section with their axes in a common plane, preferably a horizontal plane, as shown in the drawings. In accordance with the construction provided by the present invention the base section X supports the rollers 15 through bars 16 that extend longitudinally of the base section at the side edge thereof and which are secured to the inner walls of the sides 14 at the end portions thereof, as shown in the drawings. The ends of the rollers are engaged in sockets 17 in the bars and anti-friction bearings 18 support the ends of the rollers within the bars. The base section of mechanism B provides for a suitable electrical connection with the several lower contacts or rollers 15 and in the preferred form of the invention such connections are made through brushes 20 carried by the bottom 13 of

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section X so that a brush engages each of the rollers 15. In the preferred construction, as shown in Fig. 5 of the drawings, guide openings 21 are provided in the bottom 13 immediately below or in line with each roller 15, and brushes, preferably carbon brushes, operate in the upper portions of the guide bushings and have contact with the rollers. Springs 22 are carried in the bushings below the brushes to normally yieldingly urge them upwardly and into suitable pressure engagement with the rollers, and flexible leads 23 extend from the brushes downwardly through the springs 22 to suitable terminals or binding posts 24.

The head section Y of mechanism B is preferably an elongated horizontally disposed element located above or so that it overlies the base section X, and it carries the upper contacts 30 of the contacting units C which contacts are preferably in the form of balls. The guide means Z of the mechanism B relates the sections X and Y so that the head section Y is free to reciprocate or move vertically between a down or operating position such as is shown in Fig. 3, and an up or released position such as is shown in Fig. 2. The guide means Z serves to guide the head section Y vertically relative to the base section X, and in the form of the invention illustrated in the drawings it involves guideways 30 on the sides of the head section and stems 31 fixed to and projecting up from the base section X and into the guideways 30.

In the construction illustrated the head section Y involves a body 33 characterized by spaced parallel sides 34, joined by ends 35 and a block 36 which is carried in the body and which is characterized by elements or openings which form guideways for the ball contacts 30 and the parts incidental thereto.

In the case illustrated the block 36 of head section Y is sectional and involves a main section 37 of metal confined between the sides and ends of the body 33. A lower section 38 is arranged below the main section 37 and depends therefrom to enter between the bars 16 of section X when the mechanism is operating, as shown in Fig. 3. An upper section 39 occurs within the body and above the main section 37 and is preferably formed of insulating material. In the particular case illustrated a cap section 40 is arranged above the upper section 39 and carries the terminals or binding posts that will be hereinafter described.

The lower section 38 of the block 36 is provided to carry or guide the ball contacts 30 and for this purpose it is provided with a plurality of vertically disposed openings or guideways 41. In the case illustrated a plurality of ball contacts 30 cooperate with each lower or roller contact 15 and therefore the guide openings 41 are arranged in series or lines transversely of the mechanism B; which lines of guideways are in vertical alignment with or are immediately above the roller contacts 15, as shown in Figs. 3 and 5 of the drawings. The ball contacts 30 are carried in the guide openings 41 so that they can move freely therein so that they may roll about their centers and may also move or operate vertically. Suitable retainers or stops 50 are provided on the lower section 38 to limit downward movement of the balls. In the preferred form of the invention the stops or retainers 50 are in the form of discs of insulating material secured to the bottom section 38 by screws 51, and each retainer disc 50 is so located as to overlap a plurality of guide openings 41 and thus acts to retain a plurality of balls 30. It is to be understood, of course, that the structure just described is such as to allow the balls 30 to project far enough below the section Y so as to engage through openings in the control web W and make contact with the rollers 15 when openings in the web are in register with the balls.

In accordance with the present invention brushes 55 are carried by the block 36 to have contact with the ball contacts 30 and in the case illustrated the brushes 55 are carbon brushes carried in guide bushings 56 of

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insulating material located in the main section 37 of block 36. Springs 57 normally yieldingly urge the brushes 55 downwardly and into pressure engagement with the balls 30 and leads 58 extend from the brushes upwardly through the springs 57 to terminals or binding posts 59 carried by the cap section 40 of block 36, as shown in Figs. 3 and 5 of the drawings.

With the construction just described the control web W when arranged longitudinally in the mechanism B is located between the roller contacts 15 and the ball contacts 30 and separates these contacts, except when openings 60 in the web are in line with the balls 30, at which time the balls move down and make contact with the rollers 15. When the mechanism B is in operating position, as shown in Fig. 3, the web W is effectively confined and guided and the balls 30 are within reach of the rollers 15 so that the contacting units C formed by the balls and rollers and the related parts above described operate in accordance with the pattern of openings 60 in the web W. When the head section Y of mechanism B is released or elevated so that it is away from section X, as shown in Fig. 2 of the drawings, the ball contacts 30 are not within reach of the rollers 15 and the web W is free, so that it may operate or be rewound without bearing on or making contact with the parts of mechanism B except to be guided thereby.

In operating the mechanism of the present invention it is highly desirable, from an economical point of view, that the circuits handled by the contacting unit C be such as to carry current which acts to illuminate lamps 11 or the like without acting through relays. It has been found by extensive experiment that ordinarily contacts of the general type illustrated in the drawings, formed of metals, even though such metals are recognized as highly desirable for handling electric currents, do not, or will not, operate satisfactorily over any appreciable length of time handling current such as 110 volt lighting currents. By our present invention we have provided carbon brushes to engage the contacts, either the contact rollers 15 or the ball contacts 30, or both, as shown in the drawings, with the result that as the mechanism operates a deposit of carbon develops on the contacts, thus coating them, with the result that as contacts are made and broken arcing does not occur between metallic surfaces, but rather, the circuits are broken by the carbon coated surfaces and, as a result, the contacts operate over an extended period of time without pitting or other failure. Further, the protective coating established by the carbon is highly effective as an electrical conductor and not only protects the contacts but in no way impairs, but rather, if anything, improves the electrical connections made when the contacts are together.

The reversible drive E provided for handling the web W may vary widely so far as the present invention is concerned. In the present case the drive is shown as including a feed motor 65 operating a feed drum 66 over which the web W is engaged as it leaves the mechanism B, and a rewind motor 67 which operates a supply drum 68 onto which the web is wound during the rewinding operation. In the case illustrated a take-up drum 69 receives the web after it passes over the drum 66 and a pressure roller 70 operates to hold the web in pressure engagement with the drum 66. During operation or feeding of the web W the motor 65 is energized and a motor 71 is energized to operate the take-up drum 69. During rewinding the parts just described are released and the rewind motor 67 is energized so that the drum 68 is operated.

The actuator D for the mechanism B preferably involves a reversible motor M that operates to reciprocate a head 85 which is mechanically coupled to the head section Y of mechanism B. In the form of the invention illustrated the motor M operates a screw 86 which carries the head 85 and the head 85 is pivoted at 87 to arm 88 of a bell crank 89. The bell crank is pivotally

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supported at 90 and the other arm 91 of the bell crank is coupled to the upper section Y of mechanism B by a link 92. When the head 85 is reciprocated the bell crank is operated and the section Y is moved vertically. When the head is at one end of its movement or stroke, as shown in Fig. 1, the section Y is down or in operating position and when the head 85 is at the other end of its stroke the section Y is up or elevated, as shown in Fig. 2. To assure operation of the section Y without binding a plurality of bell cranks 95 are provided and each is pivotally mounted at 96, and is coupled to section Y by a link 97 and is coupled with the bell crank 89 by a link 99.

The control system related to or provided in connection with the various elements hereinabove described may vary widely in form and in the manner in which the various elements and circuits are related. In the case illustrated in Fig. 6 of the drawings the control involves, generally, a web actuated mechanism H, a reversing switch J, a stop switch K for the motor M of actuator D and control switches L for the motors 65 and 67 of drive E.

The web actuated mechanism H is responsive to or actuated by the web and in the case illustrated it is responsive to the amount of webbing on the take-up drum 69, so that it is in one actuated position when a predetermined maximum amount of webbing is wound on drum 69, and is in its other actuated position when a predetermined minimum amount of webbing is present on drum 69. The mechanism H is characterized by a lower arm 101 which is pivoted at 102 and which has contact with the exterior of the roll of webbing on drum 69 so that the arm operates or swings about its pivot as webbing is wound onto or from drum 69. Mechanism H further includes switches 103, 104 and 105 mounted on the arm 101 to be moved or shifted thereby, and it includes stops 103^a and 104^a which engage and operate switches 103 and 104 when the arm 101 is operated by the maximum amount of webbing on the drum 69, and it further includes stops 104^b and 105^b which are engaged by and operate switches 104 and 105, respectively, when the arm 101 is in the operated position resulting from a minimum amount of webbing on the drum 69.

The reversing switch J is in the circuit to the motor M and has two positions to which it is operated by the actuator D that operates the section Y of mechanism B. The switch J is so related to the actuator D that when the actuator is in one position, for instance when the section Y of mechanism B is down, switch J is closed to cause operation of motor M in one direction, whereas, when the actuator is in its opposite position or when the section Y of mechanism B is up, the switch J is in position so the motor operates in the opposite direction. In the particular case illustrated fixed element 115 of switch J is carried by frame 12 while shiftable elements 116 and 117 of switch J are carried by link 99. The relationship of these various parts is clearly illustrated in Figs. 1 and 2 of the drawings.

The stop switch K is in series with the reversing switch J and it is operatively coupled with the actuator D to be closed when the actuator is fully operated in either direction, that is, either to lower section Y of mechanism B or elevate section Y of mechanism B. In the case illustrated the stop switch involves a contact 120 engaged by a projection 121 on head 85 when the head 85 is fully operated to the left, as shown in Fig. 1, and it involves a contact 122 engaged by the projection 121 when the head 85 is fully operated to the right as shown in Fig. 2. When projection 121 engages either contact 120 or contact 122 the circuit through switch K to the motor M is completed to the switch K.

The control switches L for the motors of drive E include a switch 125 controlling motor 65. Switch 125 is engaged and operated by projection 121 of head 85 when the actuator has operated the section Y of mechanism B to the down position. Control L further in-

cludes a switch 126 controlling the rewind motor 67, which switch 126 is engaged and operated when the head 85 is fully operated to the right or to a position where the section Y of mechanism B is in the elevated position.

The switch 103 on arm 101 in series with switch 122 so that when the head 85 is at the left, as shown in Fig. 1, and the reversing switch J is set to operate the motor M so the head moves to the right and switch 103 is actuated by engaging the stop 103^a when the maximum amount of webbing occurs on the drum 69, the motor M is energized and the head 85 starts moving to the right. The switch 120 is such that contact is maintained with projection 121 during a limited movement of the head 85 to the right, after which switch 120 opens and the motor M continues to operate the screw 85 by momentum and until the head 85 reaches and actuates switches 122 and 126. When the projection 121 is moved away from switch 125 the circuit to the drive motor opens and when the projection 121 reaches and operates the switch 126 the rewind motor is energized. The rewind motor continues to operate and the motor M remains idle until the arm 101 lowers to a position where switch 105 is engaged and operated by projection 105^b, whereupon the circuit through switch 105 and 120 is completed, and at this time the reversing switch J has been reversed so that the motor M operates in the opposite direction from that previously described, with the result that head 85 moves to the left, opening switch 126 so the rewind motor is cut out and closing switch 125 so the drive motor is energized.

The switch 104 is coupled in the main circuit carrying the control units which govern the lamps 11 of the sign so that the circuit to the lamps of the sign is open during the rewind operation. In the preferred arrangement of parts a grounded circuit is employed, as indicated in Fig. 6, and the lamps L are so coupled in the circuit that a failure or short occurring anywhere in the circuit except in the simple line from the lamps to the main lead 150 will leave lamps energized.

Having described only a typical preferred form and application of our invention, we do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to ourselves any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims:

Having described our invention, we claim:

1. A web controlled contact mechanism including circuits for a device, such as an electric sign, to be controlled thereby, and comprising two support sections relatively movable toward and away from each other and arranged to receive a control web movably disposed between said support sections, one of said support sections carrying a plurality of terminal contacts in the form of rotatably mounted rolling contacts and carbon brushes each included in the circuit of a corresponding rolling contact and bearing on the said rolling contact to develop a carbon deposit thereon, and the other said support section having means providing a moving contact movable with the web and with which the rolling contacts engage to selectively complete a control circuit in accordance with the pattern of openings in said web.

2. A web controlled contact mechanism including circuits for a device, such as an electric sign, to be controlled thereby, and comprising two support sections relatively movable toward and away from each other and arranged to receive a control web movably disposed between said support sections, one of said support sections carrying a plurality of terminal contacts in the form of rotatably mounted ball contacts and carbon brushes each included in the circuit of a corresponding ball contact and bearing on the said ball contact to develop a carbon deposit thereon, and the other said support section having a roller traversing and in line with a group of ball contacts with which the ball contacts engage to selectively complete a control circuit in accordance with the pattern of openings in said web, and additional carbon brushes carried by said other support section to develop a complemental carbon deposit on the roller.

3. A web controlled contact mechanism as claimed in claim 1, wherein said rotatably mounted rolling contacts are balls.

4. A web controlled contact mechanism as claimed in claim 1, wherein said rotatably mounted rolling contacts are balls and wherein the means providing the moving contact movable with the web comprises an elongated roller.

5. A web controlled contact mechanism as claimed in claim 1, wherein said rotatably mounted rolling contacts are balls and wherein a plurality of individually removable retainer members are provided for retaining the ball contacts in association with their mounting support section.

6. A web controlled contact mechanism including circuits for a device, such as an electric sign, to be controlled thereby, and comprising two support sections relatively movable toward and away from each other and arranged to receive a control web movably disposed between said support sections, one of said support sections carrying a plurality of terminal contacts in the form of rotatably mounted rolling contacts, and the other said support section having means providing a moving contact movable with the web and with which said rolling contacts engage to selectively complete a control circuit in accordance with the pattern of openings in the web, there being carbon brush means bearing on at least certain of said contacts and aligned with said rolling contacts to develop a carbon deposit thereon and included in a corresponding contact circuit.

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