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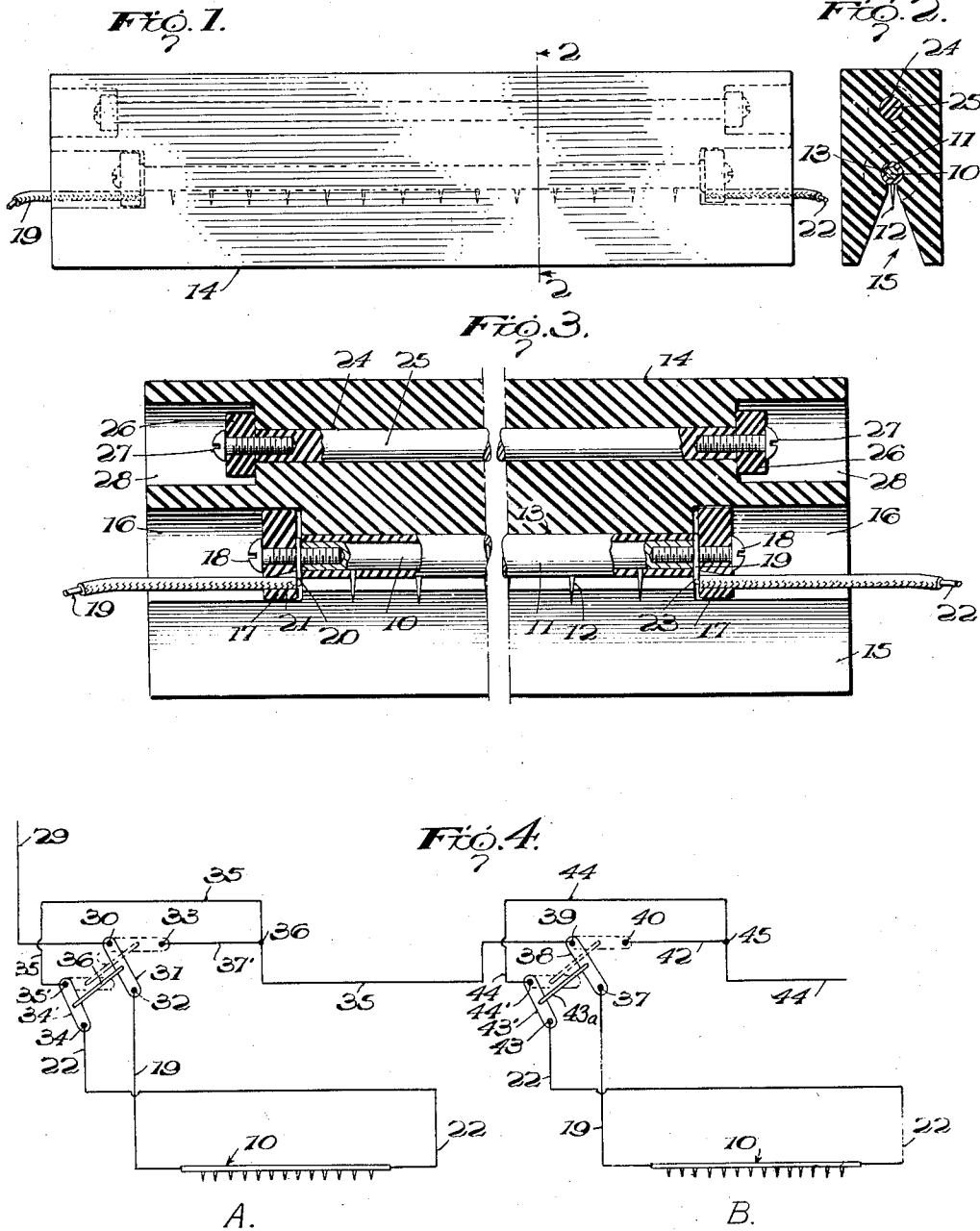
A. N. KIMBALL

2,087,915

STATIC NEUTRALIZING DEVICE

Filed Feb. 18, 1936.

2 Sheets-Sheet 1



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July 27, 1937.

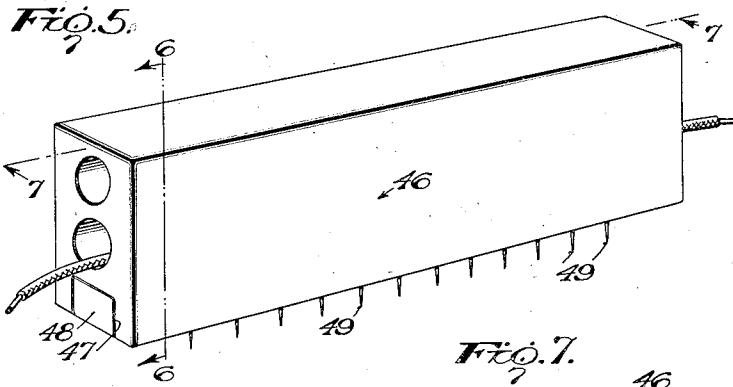
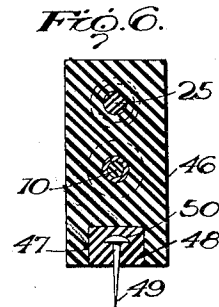
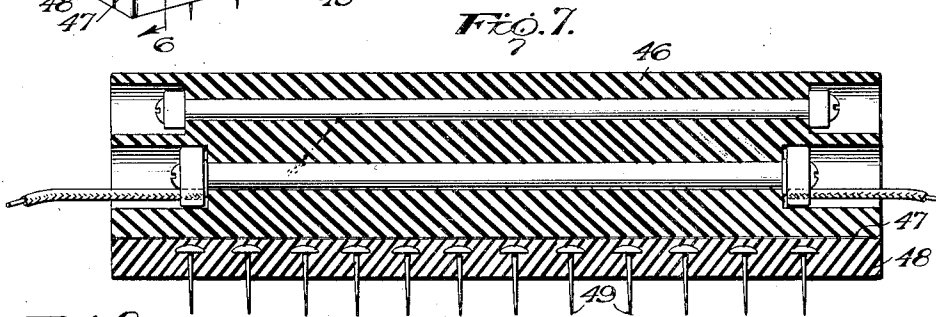
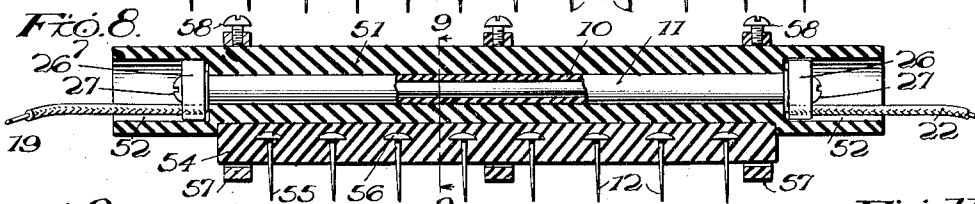
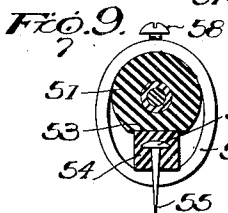
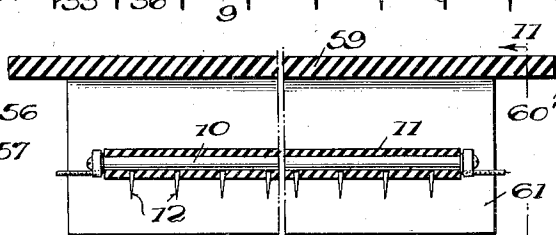
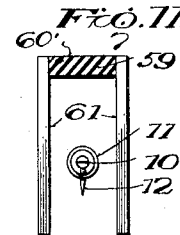
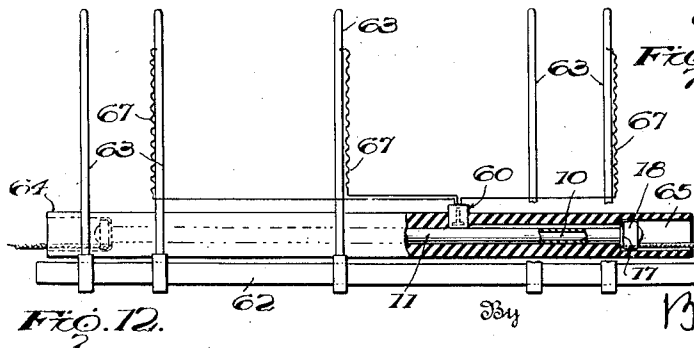
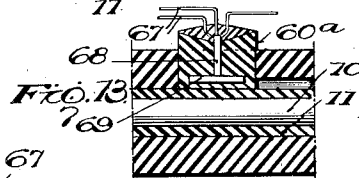
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STATIC NEUTRALIZING DEVICE

Filed Feb. 18, 1936

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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STATIC NEUTRALIZING DEVICE

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Application February 18, 1936, Serial No. 64,556

7 Claims. (Cl. 175-264)

My invention relates to means for removing or neutralizing static electric charges in moving sheets, such as paper, cloth, or the like.

An important object of the invention is to provide internal connection or connections between the wires and the bar or rod, thereby preventing short circuiting to workmen, parts of the machine, or foreign outside electrical conductors.

A further object of the invention is to provide an insulating envelope or cover for the electrical breeze producing unit, so that there is no liability of short circuiting between the electrical breeze producing elements and the workmen.

A further object of the invention is to provide a housing or casing for the electrical breeze producing unit, which housing is non-magnetic to certain types of dusts and fibers of threads or cloth running in a web or sheet beneath the neutralizing bar.

A further object of the invention is to provide means whereby the neutralizing bar may be installed upon the fly delivery mechanism of a printing press and the electrical breeze producing elements arranged upon the fly sticks, for proper coaction with the sheets for neutralizing the static electricity while the sheets are upon the fly sticks.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of a neutralizing device embodying my invention,

Figure 2 is a transverse section taken on line 2-2 of Figure 1,

Figure 3 is an enlarged central vertical longitudinal section through the device, parts broken away,

Figure 4 is a diagrammatic view showing the circuits associated with the neutralizing devices,

Figure 5 is a perspective view of a modified form of neutralizing device,

Figure 6 is a transverse section taken on line 6-6 of Figure 5,

Figure 7 is a longitudinal section taken on line 7-7 of Figure 5,

Figure 8 is a central vertical longitudinal section through a further modified form of neutralizing device,

Figure 9 is a transverse section taken on line 9-9 of Figure 8,

Figure 10 is a central vertical longitudinal sec-

tion taken through a further modified form of neutralizing device,

Figure 11 is a transverse section taken on line 11-11 of Figure 10,

Figure 12 is a plan view of a fly delivery mechanism of a printing press, showing my neutralizing device applied thereto, and,

Figure 13 is an enlarged central vertical longitudinal section through the rod and insulating guard, the inductance element being shown in elevation.

In the drawings, wherein for the purpose of illustration is shown preferred embodiments of my invention, attention being called first to Figures 1 to 4, inclusive, the numeral 10 designates a neutralizing rod or bar, formed of metal, such as iron. This neutralizing rod is covered by an insulating sleeve or tube 11. Electrical breeze producing elements or pins 12 are attached to the rod 10 and are in electrical connection therewith and pass through the insulating tube 11.

The metal rod 10 and insulating tube 11 are inserted within a longitudinal opening or passage 13, formed in a guard, shield or envelope 14 of insulating material, such as hard rubber, fiber, or the like. A downwardly flaring passage 15 is formed in the guard or shield 14, passes through one face thereof and intersects with the periphery of the opening 13. The electrical breeze producing elements 12 project into the passage 15. The passage 15 is of such a depth that the free ends of the electrical breeze producing elements 12 are spaced from the open side of the passage for a distance considerably in excess of the length of the spark which would occur on the short circuiting of the connection. This spark is approximately three-fourths of an inch or less, while the free ends of the elements 12 are preferably spaced from the open side of the passage 15 for one and one-half inches or more.

The cylindrical opening or passage 13, at its opposite ends, leads into cylindrical counter-bores 16, having larger diameters than the opening 13. These counter-bores pass through the ends of the guard or shield 14, as shown. Insulating blocks 17 are mounted within the counter-bores 16, and are secured to the opposite ends of the neutralizing rod or bar 10 by cap-screws 18. An insulated wire 19 is to be connected with one side of a source of high voltage alternating current, the opposite side being grounded. This insulated wire has the insulation removed from the free end thereof for about one and one-half inches, providing a bare portion 20. The insulated wire 19 is passed through an opening 21, formed in

the insulating block 17. The bare portion 20 of the insulated wire is wrapped around the cap-screw 18 and is thereby clamped in electrical engagement with the rod or bar 10. A wire 22 is connected with the opposite end of the rod or bar 10 and has a portion of its insulation removed to provide a bare portion 23, passed through the opening 19, and electrically clamped to the bar or rod 10 by the cap-screw 18. The counter-bore 16 is of such a length that the head of the cap-screw 18 is spaced from the opened end of the counter-bore for something more than one and one-half inches, thus affording ample protection against sparking caused by short circuiting.

The shield or guard 14 is provided with a second longitudinal opening or passage 24, receiving a metal rod 25, which may be formed of iron or the like, and this rod is held against longitudinal displacement by insulating blocks 26, secured to the rod 25 by cap-screws 27, or the like. The outer ends of these cap screws are spaced from the outer open ends of bores 23, receiving the insulating blocks 26, for something more than one and one-half inches, so that there is no liability of sparking due to short circuiting with a workman or other object adjacent to the outer end of the counter-bore 28. The function of the rod 25 is to reinforce and stiffen the casing or housing 14 and to hold the same against twisting.

Reference is had particularly to Figure 4, wherein a plurality of neutralizing rods or bars 10 are shown. The wire 29 is connected with one side of a source of high voltage alternating current, and the other side of this source of current is grounded. This wire is also connected at 30 with a double throw pivoted switch element 31, arranged to alternately engage stationary contacts 32 and 33, these elements being included in a double throw switch associated with the first neutralizing bar to the left. The contact 32 is electrically connected with the wire 19. The wire 22 of neutralizing device A is electrically connected with a stationary contact 34, to be engaged and disengaged by a swinging contact blade 34', electrically connected at 35', with a wire 35, having electrical connection at 36, with a wire 37', in turn connected with the stationary contact 33. The swinging contact blade 34' is mechanically connected with the swinging contact blade or switch element 31 by means of an insulating link 36' pivotally connected therewith. When the contact blade 31 engages the stationary contact 32, contact blade 34' engages stationary contact 34, but when contact blade 31 engages contact 33, contact blade 34' disengages contact 34. The wire 19 of the neutralizing bar B is electrically connected with a stationary contact 37, adapted to be engaged by a swinging contact element or blade 38, permanently electrically connected with a stationary contact 39, and the contact 39 is electrically connected with the wire 35. The swinging contact blade 38 is adapted to engage the contact 37, and to also engage a stationary contact 40, connected with a wire 42.

The wire 22 of the neutralizing bar B is connected with a stationary contact 43, adapted to be engaged by a swinging contact blade 43', having electrical connection at 44' with a wire 44. The wire 44 is electrically connected with the wire 42, at 45. The swinging blade 38 is mechanically connected with swinging blade 43' by means of an insulating link 43a.

When it is desired to use the neutralizing device A alone, the swinging contact 31 is brought into engagement with stationary contact 32, and

swinging contact blade 34' also engages stationary contact 34. The connection is therefore made through wire 29, swinging contact blade 31, stationary contact 32, and through wire 19 to one end of the bar 10. The swinging contact blade 38, at neutralizing device B, may now disengage both contacts 37 and 40, and swinging contact blade 43' will disengage stationary contact 43. It is thus seen that both ends of the bar 10 of neutralizing device B are disengaged from wire 29. Should it be desired to connect the bar 10 in advance of the neutralizing device B, with wire 29, swinging contact blade 38 would be brought into engagement with stationary contact 40, while swinging contact blade 43' would still disengage stationary contact 43. In order that any one bar 10 of the neutralizing device be rendered inactive, it is necessary for both ends to be disconnected from the wire 29. Bar 10, device B may be connected with wire 29, while bar 10 of device A is disconnected therefrom. To accomplish this, the swinging contact blade 31, device A, may be swung into engagement with stationary contact 33, whereby contact blade 31 will disengage stationary contact 32, and swinging contact blade 34' will disengage stationary contact blade 34. Swinging contact blade 38 will now be brought into engagement with stationary contact 37, while swinging contact blade 43' will engage stationary contact 43. The bar 10 of device A, has both ends disconnected from the wire 29, but the connection is made between bar 10 of device B and wire 29, such connection being made through wire 29, swinging contact blade 31, contact 33, wire 37', a portion of wire 35, contact 36, contact 37, wire 19, and one end of bar 10, device B. The opposite end of bar 10 is connected with the wire 44 so that the next succeeding bar 10 may be connected with wire 29, if desired. The neutralizing bar 10, device A, may also be connected in series with the bar 10 of device B, and to accomplish this, contact blade 31 is brought into engagement with stationary contact 32, and contact blade 34' into engagement with stationary contact 34 and blade 38 engages stationary contact 37, and swing contact blade 43' engages contact 43. The connection is now made from wire 29, through swinging contact 31, stationary contact 32, wire 19, one end of bar 10, device A, through bar 10, wire 22, stationary contact 34, contact blade 34', connection 35', wire 35, contact blade 38, contact 37, wire 19, and to bar 10, device B, and then to the succeeding bar 10, if there is one, and if it should be desired to connect the succeeding bar 10 in series with bar 10, device B.

The housing 14 is supported suitably near the travelling sheets or webs of paper, cloth, or the like, by an insulating clamp, and the electrical breeze producing elements 12 will remove or neutralize the static electricity within or from the sheets.

In Figures 5 to 7, I have shown a slightly modified form of electrical breeze producing device. This device embodies a casing or housing 46, formed of insulating material, such as hard rubber, fiber, or the like. This casing or housing is equipped with the identical rod or bar 10 and associated elements, and the wires 19 and 22 are connected with the rod or bar 10 in the identical manner, as described in connection with Figures 1 to 4, inclusive. The housing 46 is also equipped with the identical reinforcing rod 25 and associated elements. The housing 46 has a groove 47 formed upon its lower side for receiving a key 48, 75

formed of insulating material, and a plurality of condensers are mounted upon this insulating key 48, including pins 49, having heads 50. These headed pins are formed of iron or the like. A plurality of the neutralizing devices shown in Figures 5, 6, and 7, may be connected in series, if desired.

In Figures 8 and 9, I have shown a still further modified form of neutralizing device. This device includes an insulating tubular guard or housing 51, formed of rubber, fiber, or the like. This guard or housing receives and holds one of the bars 10 equipped with the insulating sleeve 11, the same insulating blocks 26 and cap-screws 27 are employed to connect the wires 19 and 22 with the opposite ends of the bar 10, and these connections are effected at a point inwardly sufficiently from the free ends of the counter-bore 52, so that there is no liability of sparking due to short circuiting. In this form of the invention, the reinforcing rod 25 and associated elements are omitted. The insulating tube 51 is provided with an exterior longitudinal groove 53, receiving an insulated key 54 within which are imbedded metal condenser elements, in the form of pins 55, having heads 56. The insulating key is held in place within the grooves 53 by rings 57, having set screws 58. It is obvious that two or more of these neutralizing devices, as shown in Figures 8 and 9, may be connected in series.

In Figures 10 and 11, I have shown a neutralizing bar which will not become magnetic to certain types of dusts and fibers of threads and cloth, running in webs or sheets beneath the neutralizing bar. When the neutralizing bar becomes magnetic to this dust or fiber, the machines may become clogged, making shut downs necessary. I have discovered a method of overcoming this magnetic influence of the neutralizing bar and to accomplish this, I employ a second bar which does not become magnetic and this second bar, which is thus non-magnetic, is a housing or envelope for the neutralizing bar. The neutralizing bar which I employ is the same neutralizing bar 10 enclosed in the insulating sleeve or tube 11 and carrying the breeze producing elements or pins 12. This unit is attached to the machine and insulated therefrom in a position over the moving cloth or web by a suitable insulating clamp. Over this bar or unit I suspend the non-magnetic hollow bar or housing 59, formed of electrical insulating material, such as hard rubber, fiber or the like, and including a body portion 60', and spaced sides 61. This housing is held out of contact with the rod or unit 10 therein and supported by a suitable insulating clamp. The rod or unit within the housing, being separated from the housing by a considerable amount of air, this air acts as a condenser and prevents induction in the housing, thereby rendering it non-magnetic to dust, lint, etc. At the same time the housing serves to enclose the bar 10.

In Figure 12, is shown the fly mechanism of a printing press, which includes a rock shaft 62 and fly fingers 63. A tubular housing 64, of insulating material, such as rubber or fiber, is provided, and receives therein the rod 10, having the insulating tube 11. Counter-bore 65 are provided so that the same insulating blocks 17 and cap-screws 18 may be used, and so that the wire 19 may be connected with one end of the rod 10. This connection is effected at a point sufficiently inwardly of the outer end of the counter-bore 65, so that sparking is eliminated. Any suitable number of small bare wires 67 pass into a con-

denser housing 66a, formed of insulating material, and are therein electrically connected with a pin 68, having a head 69, arranged in inductive relation to the bar 10, so that the current is induced therein. The small bare wires 67 extend longitudinally of the fly-sticks 63, are connected therewith, disposed exteriorly thereof and terminate near the free ends of the fly-sticks.

It is to be understood that the forms of my invention herewith shown and described are to be taken as preferred examples of the same and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, what I claim is:

1. A static neutralizing device comprising a guard formed of insulating material and having a longitudinal opening and a longitudinal counter-bore at one end of the longitudinal opening, a metal rod held within the longitudinal opening, electrical breeze producing elements arranged in cooperative relation to the metal rod, an insulating block arranged within the longitudinal counter-bore at its inner end and having an opening, an insulated wire passed through the counter-bore and the opening in the insulating block and having a bare end portion arranged inwardly of the block for electrical connection with the adjacent end of the metal rod, and means to connect the insulating block with the metal rod, the insulating block covering the bare end portion of the wire and also serving to limit the longitudinal movement of the metal rod in one direction with relation to the guard, the length of the counter-bore being such that short circuiting at the connections with an object adjacent to the outer end of the counter-bore is eliminated.

2. A static neutralizing device comprising a guard formed of insulating material and having a longitudinal opening and longitudinal counter-bore at the opposite ends of the longitudinal opening, a metal rod held within the longitudinal opening, electrical breeze producing elements arranged in cooperative relation to the metal rod, insulating blocks arranged within the longitudinal counter-bore at their inner ends and having wire receiving openings, cap-screws connecting the insulating blocks with the opposite ends of the metal rod, and insulated wires extending through the counter-bore and the wire receiving openings and having bare portions disposed inwardly of the insulating blocks, such bare portions being adapted to engage with the cap-screws and metal rod, the length of the counter-bore being such that short circuiting at the connections with the ends of the metal rod is eliminated the insulating block serving to cover the bare portions of the wires and also serving to limit the longitudinal movement of the metal rod in opposite directions with relation to the guard.

3. A static neutralizing device comprising an elongated guard formed of insulating material, said guard having a longitudinally extending opening and a longitudinally extending passage leading into the side of the opening throughout the major portion of the length of the opening, said passage having its outer side open, said guard having longitudinal counter-bore at its ends which lead to the longitudinally extending opening, electrical breeze producing elements extending into the passage, a metal rod held within the longitudinal opening and having the

breeze producing elements attached thereto for movement therewith, insulated wires passing through the longitudinal counter-bores and having connections with the metal rod, the length of the counter-bores being such that short circuiting at the connections with an object adjacent to the outer ends of the counter-bores is eliminated, and the passage having a depth greater than the length of the electrical breeze producing elements so that short circuiting at the electrical breeze producing elements with an object adjacent to the open side of the passage is eliminated, the arrangement being such that the metal rod and breeze producing elements may be arranged within the elongated guard by passing the metal rod longitudinally within the longitudinally extending opening, and insulating elements arranged within the longitudinal counter-bores to cover the ends of the metal rod and to also limit its longitudinal movement in opposite directions with relation to the guard.

4. A static neutralizing device comprising an elongated guard formed of insulating material, said guard having a longitudinal opening extending throughout the major portion of the length of the guard, a counter-bore at the end of the opening, and a longitudinal groove extending throughout the major portion of the length of the opening, a continuous metal rod held within the longitudinal opening and extending throughout the major portion of said opening, an insulated wire passing through the counter-bore and having connection with the metal rod, the counter-bore being of a length to prevent short circuiting at the connection with an object adjacent to the outer end of the counter-bore, a continuous insulating key held within the groove and extending throughout the major portion of the length of the groove, and metal elements having heads which are imbedded within the key and arranged in inductive relation to the metal rod.

5. A static neutralizing device comprising an elongated guard formed of insulating material, said guard having a longitudinal opening and a longitudinal groove, the longitudinal opening extending throughout the major portion of the length of the elongated guard and the longitudinal groove extending throughout the major portion of the length of the longitudinal opening, a continuous metal rod held within the longitudinal opening, an insulated wire having con-

nection with the metal rod, an insulating key arranged within the groove extending throughout the major portion of the length of the groove, rings surrounding the guard and key, and headed metal elements imbedded within the insulating key and disposed in inductive relation to the metal rod.

6. The combination with the fly mechanism of a printing press including a rock shaft and fly fingers, of an insulating housing mounted upon the mechanism adjacent to the rock shaft, a metal rod held within the housing, an insulated wire passing into one end of the housing and having connection with the rod at a point remote from the outer end of the housing so that short circuiting at the connection with an object adjacent to the outer end of the housing is eliminated, electrical breeze producing elements carried by the fly fingers, and bare wires extending between the metal rod and the breeze producing elements.

7. A static neutralizing device comprising an elongated guard formed of insulating material, said guard having a longitudinal opening extending throughout the major portion of the length of the guard, said guard having a longitudinal counter-bore at one end of the opening, the counter-bore being of a larger diameter than the opening and in communication therewith, the guard having a longitudinal groove extending throughout the major portion of its length, a continuous metal rod held within the longitudinal opening and extending throughout substantially the entire length of the opening, an insulating wire passing through the longitudinal counter-bore and having connection with one end of the metal rod, an insulating block arranged within the counter-bore and covering the adjacent end of the metal rod and attached to the metal rod and serving to limit the longitudinal movement of the metal rod in one direction with relation to the guard, the counter-bore being of a length to prevent short circuiting between the adjacent end of the metal rod and an object at the outer end of the counter-bore, a continuous insulating key held within the groove and extending throughout its entire length, and metal elements having heads which are embedded within the key and arranged in inductive relation to the metal rod.

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