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2,607,841

MULTIPLE ELECTRIC CIRCUIT CONTROLLER

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FIG. 1

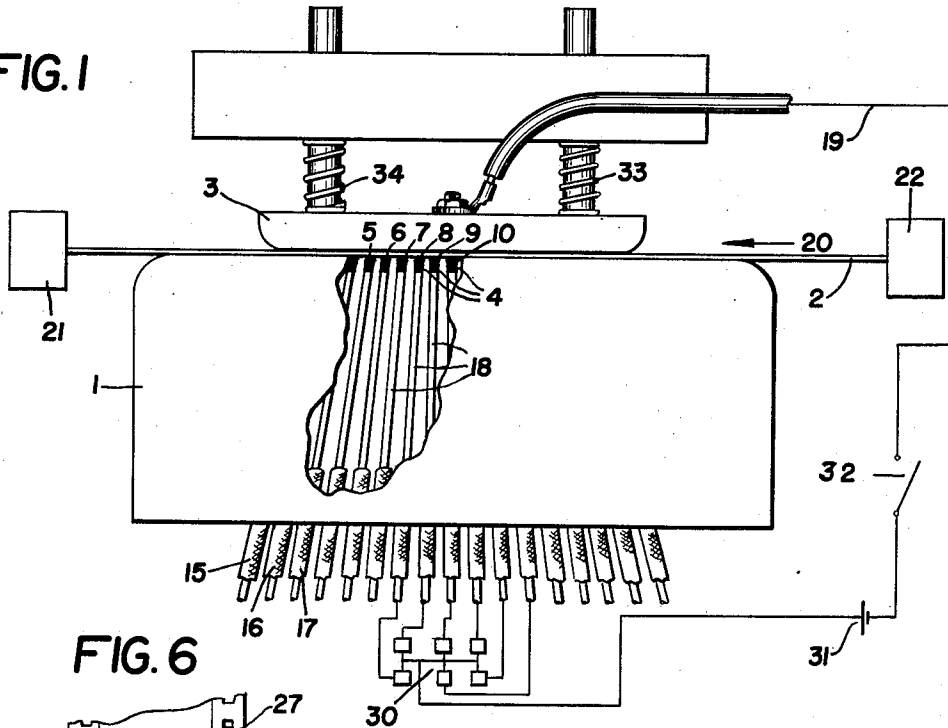


FIG. 6

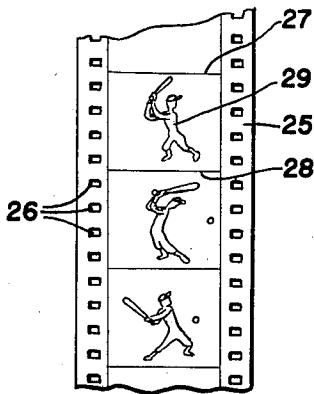


FIG. 5

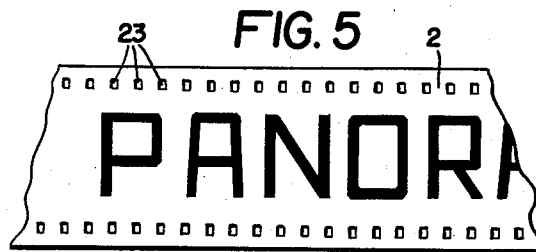


FIG. 2

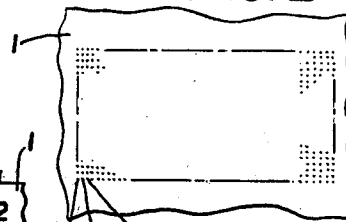


FIG. 3

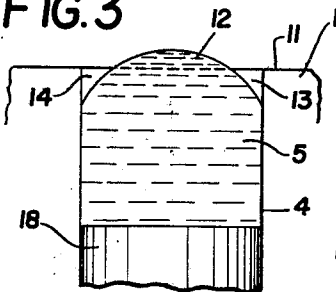
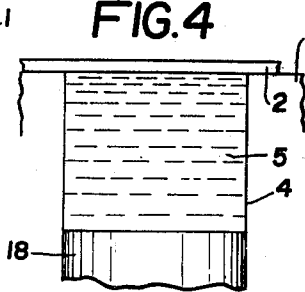


FIG. 4



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MULTIPLE ELECTRIC CIRCUIT
CONTROLLER

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5 Claims. (Cl. 177—350)

1

This invention relates to electricity especially to circuit controlling devices and more particularly to circuit controlling devices adaptable to control a multiplicity of circuits.

A principal object of this invention is to provide a circuit controller of low cost and of relatively slight dimensions which is operative to energize all or any number of a relatively great number of electric circuits, simultaneously or successively in any order.

A further object of the invention is to provide a device of the type specified which will be especially adapted to control the flow of electrical energy to a multitude of substantially identical electrical devices, such as a multitude of closely associated electric lamps, in such a manner that by the illumination or non-illumination of the lamps a desired configuration may be exhibited as stationary or movable, recognizable visually as a letter or word, or a thing or place or as an illusion of motion of a figure or figures.

Other objects and advantages will appear as the description of the particular physical embodiment selected to illustrate the invention progresses and the novel features will be particularly pointed out in the appended claims.

In describing the invention in detail and the particular physical embodiment selected to illustrate the invention, reference will be had to the accompanying drawings and the several views thereon, in which like characters of reference designate like parts throughout the several views, and in which:

Fig. 1 is a diagrammatic view of an apparatus embodying my invention; Fig. 2 is a fragmentary top plan view of an insulating wire retaining block exhibited in Fig. 1; Fig. 3 is a view illustrating the position of a body of mercury used as an electrical contacting member in the device as shown by Fig. 1; Fig. 4 is a view similar to Fig. 3, but illustrating the mercury in a depressed state; Fig. 5 is a fragmentary view of a portion of circuit controlling ribbon usable with the device of Fig. 1; Fig. 6 is an illustration of a portion of circuit controlling ribbon usable in connection with the device of Fig. 1 whereby an illusion of motion of a human figure may be effected.

It is well known that structures of large superficial area are commonly erected in prominent positions, especially upon the tops of buildings in such cities as New York, which are studded over their entire area with closely spaced electric lamps and that these lamps are sometimes permanently illuminated in such manner as to exhibit what might be called a still picture and

2

at other times are so illuminated as to give a picture having a varied aspect sometimes giving the illusion of a motion of either animate or inanimate things.

It is also well known that when one of these signs includes a very great number of electric lamps, the circuit controlling means necessary to control the lamps is of a very extensive character and is costly to manufacture and install and occupies a very considerable space. This is especially true where the sign is used in such a manner as to give the illusion of motion.

I reduce the cost and bulk of the necessary circuit controller for the proper control of the so-called illuminated signs and I do this by providing a circuit controller of such construction that moving mechanically operated parts requiring positive reciprocation or rotation is quite fully avoided. I accomplish my object mainly because I employ a liquid as a contacting surface. The use by me of a liquid as a contacting surface further enables me to use as the cooperating electric circuit controller part an elongated conductive member having portions rendered non-conductive by an extremely thin coating of a relatively soft material easily scratched or scraped off by a rigid relatively inflexible contacting member but which may successfully pass over a liquid contacting member without injury so that I am enabled to use as a cooperating circuit closing means in connection with my liquid a ribbon-like structure approximating an ordinary motion picture film the base of which, however, is formed of metal rather than celluloid or other plastic.

In order to control a large number of plurality or multiplicity of electric circuits employing a liquid as one contact or pole of the circuit controller and to be able to use a metallic ribbon as the other contact or pole of the circuit controller and have that metallic ribbon of a width approximating that of the ordinary commercial motion picture film, it is necessary to have my points of liquid contact all positioned within an extremely limited area. I contemplate being well able to have 576 liquid contact points within an area of one square inch.

In order to embody my fundamental concept in tangible materials, I prefer to have my liquid contact points at the plane surface of a block of electric insulating material as 1.

With my contact points at the surface of a block of insulating material 1, I may then pass or slide a ribbon 2 over the surface of the block while I press it firmly in contact with the block

3

by a presser foot 3, and if the ribbon 2 has non-conductive coatings thereon on the side presented to the liquid contact points and if the presser 3 is made one side of a circuit and electric conductors are connected to each of the liquid contact points, the passing of the ribbon 2 over the surface will cause the circuits to be made and broken in accordance with the surface coating of the ribbon 1, as such mercury meniscus will be contacted and flattened.

I have shown a preferred form of my invention in Fig. 1. The block of insulating material 1, formed of any suitable plastic such as glass, or a phenol-formaldehyde resin, or hard rubber, may in one condition be caused to flow around a multitude of wires and in another condition be relatively solid.

I prefer to have my liquid contact points formed by metallic mercury and I prefer to have this mercury deposited in cavities 4 opening in the upper face of the block 1 as shown in Fig. 1.

Each contact point of mercury as 5, 6, 7, 8, 9 and 10; when ribbon 2 is not pressed thereagainst, will appear as shown in Fig. 3, that is, the cavity 4, of a definite volumetric capacity will have a body of mercury as 5 therein of such volume that the mercury will protrude from the upper plane face 11 of the block 1. It is well known that mercury forms a convex meniscus when in a capillary tube or depression. I take advantage of this fact and put such a volume of mercury in the cavities, as 4, that I will produce a perceptible protrusion as a convex meniscus of the mercury above the top surface 11 of the block 1. This protrusion is designated 12 in Fig. 3. The volume of mercury will also be such that if pressure is applied to the top of the meniscus the mercury will be depressed and flattened and then substantially just fill the cavity 4 because the volume of mercury in the meniscus above the top face 11 is substantially equivalent to the empty spaces 13 and 14 of the cavity 4. The result is that when the ribbon 2 is drawn over the top of the block 1 and pressed against the top face 11 of the block the mercury 5 will assume the condition as shown in Fig. 4 with all the to face thereof abutting the ribbon 2. No mercury will be dragged or pushed out of the cavity 4 due to the ribbon 2 being drawn thereover so that after the ribbon passes over the opening of the cavity 4 the mercury will re-assume the condition as shown in Fig. 3. However, if there is an excess of mercury in the cavity which has not been properly removed by drawing a "striker" across the face of the block 1, then that excess mercury may be dragged away by ribbon 2, but this will cause no difficulty because there will always be left sufficient mercury to just fill the cavity 4 as shown by Fig. 4.

In order to produce the cavities 4 opening in the face 11 of the block 1, I arrange a series of wires as 15, 16, 17 made of any proper electrically conducting material, as copper, with the bared ends as 18 protruding through the face of the block or positioned so that they will protrude when the material of the block 1 is cast or otherwise positioned about them. The bared ends 18 of the wires will be electrically insulated one from the other by the insulating material of the block 1, and when the material of the block 1 is set, the protruding ends of the wires may be clipped off and then a suitable acid, such as nitric acid, may be applied to the face 11 of the block 1 and the ends dissolved or eaten away for a suitable distance downwardly from the

4

plane face 11 of the block as in Fig. 1 to make a cavity of proper depth 4.

I, of course, do not mean to exclude other methods of forming the cavities 4 because they can be made by drilling or a similar method. The method which I prefer, however, produces a cavity 4 which is entirely mercury tight except for the opening in the face 11 as the bared ends 18 are so tightly grasped by the material of block 1 that the mercury cannot leak down between the wires and the material of the block.

As shown in Fig. 2, electrically conducting means as the wires as 15, 16 and 17 may be positioned in a block 1 so closely together that there may be, as I have already stated, easily as many as 576 to a square inch arranged in multiple rows, each dot of Fig. 2 designating a mercury meniscus and so a wire.

Each of the wires, as 15, 16 and 17 is connected at one end to a mercury pool and may be connected at the other end to separate and independent electrical devices 30, to be controlled, such, for instance, as lamps. The other terminal of the device would be, of course, connected to a source of potential, as 31, and the other side of the source of potential could be connected by an electrical conductor 19 to the electrically conducting, preferably metal, presser shoe 3, interposing an electrical switch 32. The presser shoe 3 bearing directly upon the bared metal of the upper face of the metal ribbon 2 would then act to complete a circuit through the metal ribbon and a mercury contact point.

The metal ribbon 2 would be actuated by suitable mechanism to move in the direction of the arrow 20. This suitable mechanism could well be the mechanism of an ordinary motion picture projector, as at 21, taking the ribbon from a mechanism denoted by the numeral 22, such as a reel.

In Fig. 5, I have shown a ribbon 2 formed of a suitable electrical conducting material preferably iron or steel. This ribbon is preferably provided with the ordinary motion picture film sprocket holes 23 which may serve to actuate the ribbon by means of the actuating mechanism 21. This ribbon, of course, should be made of metal of such thickness and width as will enable it to be wound on a reel as 22.

For the purpose of illustrating how my invention may be utilized I have illustrated a portion of a word on the ribbon 2 of Fig. 5. This would be placed on the ribbon in any desired or appropriate manner. It could be painted on by hand using an electrical insulating paint, such as asphaltum. It could be stamped thereon by means of an ordinary rubber stamp with a non-conducting ink. It could be formed thereon by making use of the photographic processes as by coating the entire film with bichromated gelatin, then exposing the ribbon as in a camera to the desired words painted white on a black background so that the gelatin not exposed to light could be washed off the film rendering it conductive in all parts except where gelatin representing the white words appear. Further, I do not mean to exclude the use of a ribbon which has been coated with a film of bichromated gelatin then suitably photographically exposed, then the soft unaffected gelatin washed off and the parts thereunder etched to some appreciable depth after which the entire film ribbon is cleaned and then the etched portions of the ribbon filled even with the surface of the ribbon with

5

a rather hard lacquer of non-electrical conducting properties.

Having obtained a ribbon such as that shown by Fig. 5, having a desired pattern thereon, upon passing it through the device of Fig. 1, a bank of closely adjacent lamps governed by the device of Fig. 1 would exhibit the wording as shown on the ribbon, Fig. 5, and would show it as dark letters against an illuminated background and as though the letters were moved across the sign. That is electrical potential would be selectively applied in a predetermined manner to the mercury pools.

It is to be understood that by the illustration and description of a ribbon, such as that shown in Fig. 5, I do not mean to exclude the use of a precisely similar ribbon, but with all portions of the ribbon rendered non-conducting except those portions which represent a letter so that if such a ribbon were put through the device of Fig. 1, there would appear upon a sign illuminated letters surrounded by a dark background.

I have also shown a metallic ribbon, preferably formed of iron or steel in Fig. 6. This ribbon 25, is preferably arranged with sprocket holes 26 and has image spaces thereon, as between the imaginary line 27 and the imaginary line 28. In each of these image spaces a figure may be produced and the figures in the various spaces may be related one to the other as in the ordinary motion picture film or the so-called animated film, that is, if such a film of transparent film material were put through an ordinary motion picture projector and the picture projected on the screen, the illusion of motion would be produced. The various figures as 29 on the ribbon 6 may be produced in any of the well-known and appropriate ways as by hand painting, stamping or photography as by bichromated gelatin and if produced by photography may be formed from either actual objects or persons or suitably made drawings.

Although I have shown and described the wire 19 connected to a presser foot 3 in order to connect the ribbon 2 with a source of potential, of course I do not intend to exclude a construction in which the metallic ribbon is connected to the source of potential by means of a mercury meniscus in the face of the block 1.

If it is desired to avoid irritating flashes when the ribbon 2 moves from one position to another, the source of potential may be disconnected from the ribbon 2 during that time by the manually operated switch 32. Of course, I do not mean to exclude by this simple showing the use of an automatically operated switch from accomplishing the same function operated in connection with the driving or pulling mechanism for ribbon 2.

Although presser foot 3 may be made of sufficient weight to suitably press ribbon 2 against the top of the block 1, I may, if necessary, use, in addition, springs, as 33 and 34 to push the presser foot against the ribbon 2 and so the ribbon 2 against the top of block 1. Although I have illustrated and described a presser foot 3 made of solid material, I do not want it to be understood that I mean to exclude other forms of presser foot as it might well be advantageous to use a presser foot of the general nature of a brush, that is, a somewhat solid body studded all over with protruding spring fingers which would cover the entire area of the top of the ribbon in contact with the mercury pools so as to, in effect, press down the ribbon over each individual pool.

6

As I prefer to form my cavities in the block 1 for the reception of the mercury by dissolving out the ends of the wires as 18, I, of course, would select a plastic material for block 1 which would not be injuriously effected by the dissolving acid used.

Although I prefer to make the ribbon 2 of ferrous material, as iron or steel, I desire to have it understood that the determining characteristic in selecting the metal is whether or not that metal has such an affinity for mercury that objectionable amalgamation or wetting by the mercury occurs. It is quite essential that the metal used for the ribbon 2 should be one which is substantially non-wetting by mercury and also non-amalgamating. In fact, there is no reason why electrically conducting glass may not be used as a ribbon.

The block 1 with associated parts may be considered as one pole of an electric switch. The other pole would be ribbon 2.

From the hereinbefore given description it will be seen that I have produced an extremely simple, inexpensive, small bulk device by which I can control an immense number of circuits by the use of desirably formed metallic ribbons approximating the width of the ordinary commercial motion picture film and may thus control a multiplicity of circuits governing a multiplicity of lamps positioned closely adjacent over the superficial area of a large sign in such manner as to exhibit the desired configuration of illumination of the lamps to exhibit as a still, or may shift from one still to another still by a simple motion of the ribbon or may give the illusion of motion to a configuration corresponding to inanimate or animate things.

Although I have particularly described one particular physical embodiment of invention and explained the construction and principle thereof, nevertheless, I desire to have it understood that the form selected is merely illustrative, but does not exhaust the possible physical embodiments of the idea of means underlying my invention.

What I claim as new and desire to secure by Letters Patent is:

1. A device for exhibiting minute images by lighted electric lamps, including in combination, a metallic ribbon of a width approximating that of an ordinary motion picture film formed on its face with a succession of picture spaces containing images depicting a body in motion, said images exhibiting the fineness of detail of that produced by physico-chemical optical methods, said images formed in part by bare ribbon, electrically conducting, and in part by electrically insulating coating, an electrical insulating body formed with a plane face formed with a plurality of cavities opening in the face, said cavities, in number, being of the order of at least 400 to the square inch, a pool of mercury in each body cavity, the volume of each cavity being such that each cavity will contain all of the mercury therein when the mercury meniscus is completely flattened, a plurality of electric lamps, a source of potential, means for moving the ribbon longitudinally relatively to the body face, means for causing the ribbon and body to move relatively one toward the other, and for pressing the ribbon face and body face together whereby the mercury menisci are flattened and contact the several parts of the face of the ribbon, electrical conducting means bearing on the back of the ribbon and electrically connected to the source of po-

tential, means electrically connecting the electric lamps with the source of potential, and conductors, one electrically connecting each pool of mercury with an electric lamp.

2. A device for exhibiting minute images by lighted electric lamps, including in combination, a metallic ribbon of a width approximating that of an ordinary motion picture film formed on its face with a succession of picture spaces containing images depicting a body in motion, said images exhibiting the fineness of detail of that produced by physico-chemical optical methods, said images formed in part by bare ribbon, electrically conducting, and in part by electrically insulating coating, an electrical insulating body formed with a plane face formed with a plurality of cavities opening in the face, said cavities, in number, being of the order of at least 576 to the square inch, a pool of mercury in each body cavity, the volume of each cavity being such that each cavity will contain all of the mercury therein when the mercury meniscus is completely flattened, a plurality of electric lamps, a source of potential, means for moving the ribbon longitudinally relatively to the body face, means for causing the ribbon and body to move relatively one toward the other, and for pressing the ribbon face and body face together whereby the mercury menisci are flattened and contact the several parts of the face of the ribbon, electrical conducting means bearing on the back of the ribbon and electrically connected to the source of potential, means electrically connecting the electric lamps with the source of potential, and conductors, one electrically connecting each pool of mercury with an electric lamp.

3. A device for exhibiting minute images by lighted electric lamps, including in combination, a metallic ribbon of a width approximating that of an ordinary motion picture film formed on its face with a succession of picture spaces containing images depicting a body in motion, said images exhibiting the fineness of detail of that produced by physico-chemical optical methods, said images formed in part by bare ribbon, electrically conducting, and in part by electrically insulating coating, an electrical insulating body formed with a plane face formed with a plurality of cavities opening in the face, said cavities, in number being of the order of at least 400 to the square inch, a pool of mercury in each body cavity, a plurality of electric lamps, a source of potential, means for moving the ribbon longitudinally relatively to the body face, means for causing the ribbon and body to move relatively one toward the other, and for pressing the ribbon face and body face together whereby the mercury menisci contact the several parts of the face of the ribbon, electrical conducting means bearing on the back of the ribbon and electrically connected to the source of potential, means electrically connecting the electric lamps with the source of potential, and conductors, one electrically connecting each pool of mercury with an electric lamp.

4. A device for reproducing, enlarged, images of a size of the order of those of an ordinary mo-

tion picture film, by electric lamps, including in combination, a thin, narrow ribbon formed on its face with a succession of images, said images exhibiting the fineness of detail produced by physico-chemical optical methods, said images being in part electrically conducting and in part electrically insulating, a plurality of mercury menisci, in number, being of the order of at least 400 to the square inch, a plurality of electric lamps, a source of potential, means for moving the ribbon longitudinally relatively to the mercury menisci, means for causing the ribbon and mercury menisci to move relatively one toward the other and making electrical contact therebetween whereby the mercury menisci are placed in electric circuit with the several electrically conducting parts of the face of the ribbon, electrical conducting means connecting the electrical conducting parts of the face of the ribbon with the source of potential, means electrically connecting the electric lamps with the source of potential, and conductors, one electrically connecting each mercury meniscus with an electric lamp.

5. A device for reproducing, enlarged, the minute details of images exhibiting the fineness of detail produced by physico-chemical optical methods, by electric lamps, including in combination, a metallic ribbon formed on its face with a succession of images, said images exhibiting the fineness of detail produced by physico-chemical optical methods, said images formed in part by bare ribbon, electrically conducting, and in part by electrically insulating coating, a plurality of mercury menisci electrically insulated one from the other, in number, being of the order of at least 400 to the square inch, a plurality of electric lamps, a source of potential, means for moving the ribbon longitudinally relatively to the mercury menisci, means for causing the ribbon and mercury menisci to move relatively one toward the other and make electrical contact between the menisci and the bare parts of the face of the ribbon, electrical conducting means connecting to the back of the ribbon and electrically connected to the source of potential, means electrically connecting the electric lamps with the source of potential, and conductors, one electrically connecting each mercury meniscus with an electric lamp.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
762,040	Freese	June 7, 1904
1,203,049	Recke	Oct. 31, 1916
1,616,309	Eeles et al.	Feb. 1, 1927
1,742,229	Wood	Jan. 7, 1930
1,838,654	Bowers	Dec. 29, 1931
2,049,771	Gwyn	Aug. 4, 1936
2,435,725	Paris	Feb. 10, 1948
2,473,371	Heath	June 14, 1949