June 20, 1950 J. H. DE LACY 2,512,487

CYLINDRICAL PHOTOGRAPHIC PRINTING DEVICE

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Fig. 1

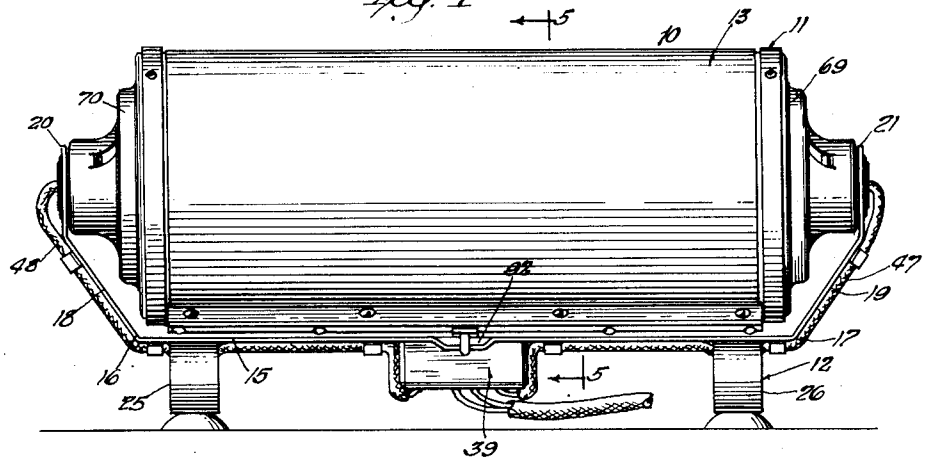


Fig. 2

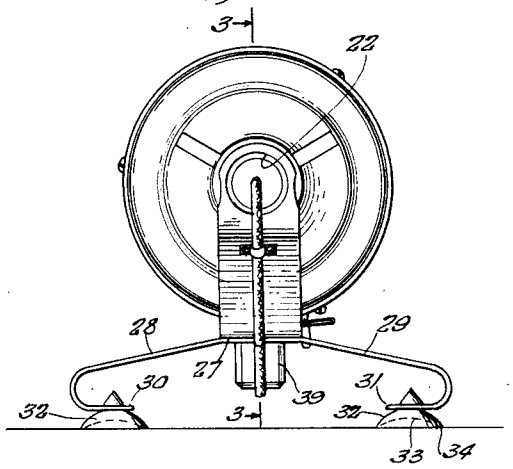


Fig. 3

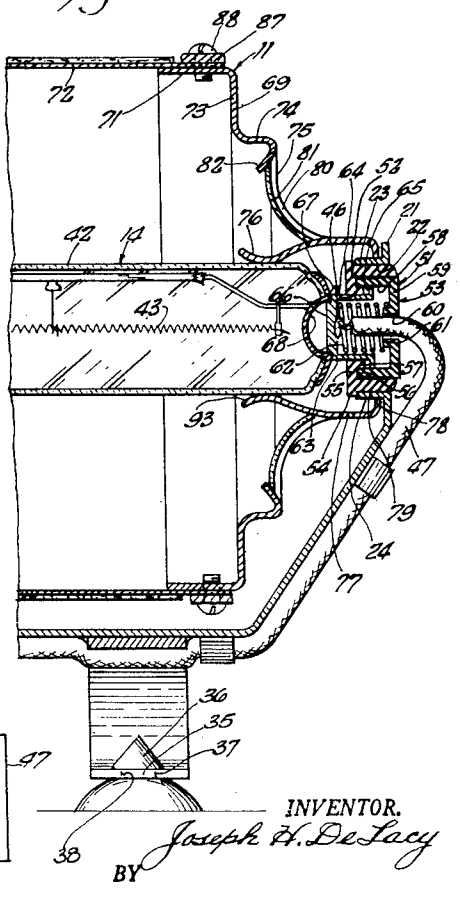
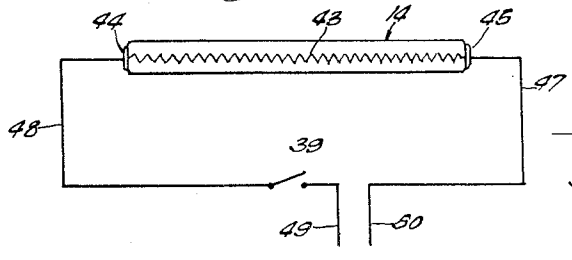


Fig. 4



INVENTOR.
Joseph H. DeLacy
BY
Robert W. Mendt
Atty.

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Fig. 5

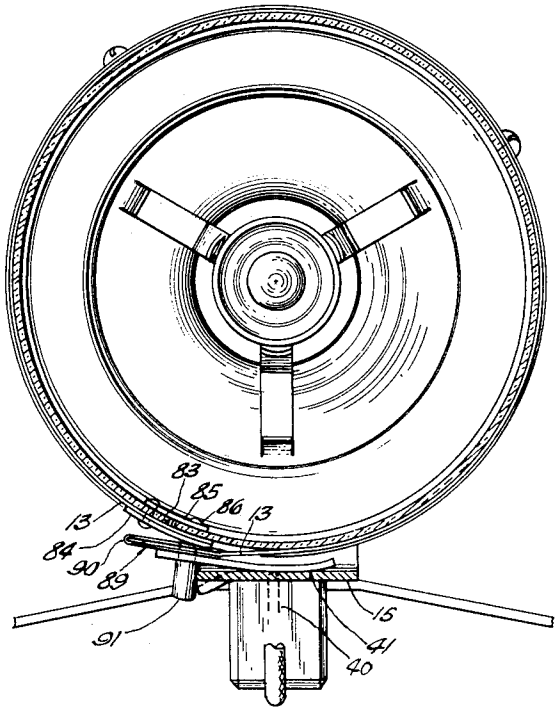
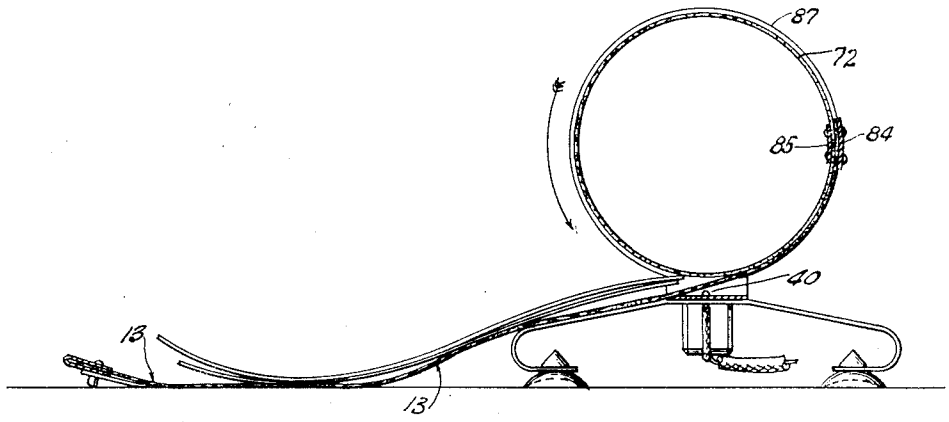


Fig. 6



INVENTOR.
Joseph H. DeLacy
BY
Robert H. Mundt
Atty.

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CYLINDRICAL PHOTOGRAPHIC PRINTING DEVICE

Joseph Henry De Lacy, Chicago, Ill., assignor to Samuel G. Rautbord, Chicago, Ill.

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4 Claims. (Cl. 95—77.5)

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The present invention relates to photographic printing devices, and is particularly concerned with printing devices of the type adapted to be used with artificial illumination to make photographic copies of anything which is carried by a thin sheet.

One of the objects of the invention is the provision of an improved printing device of the class described which is simple, adapted to be manufactured at a low cost, has a minimum number of parts, is easy to operate, and is adapted to provide a substantially perfect and uniform illumination over all parts of the subject.

Another object is the provision of an improved device of the class described which involves a minimum amount of machining, and most of the parts of which are adapted to be made on a punch press, where the device may also be assembled so that it may be constructed at such a low cost that it may be sold within the range of price of toys, although the device itself is capable of general application to the making of photographic copies of letter size or smaller.

Another object of the invention is the provision of an improved construction which provides for a maximum print area in a minimum volume by utilizing the full cylindrical shape of the barrel, and which is provided with a source of illumination extending beyond the illuminated portions of the barrel so that the edges will also be perfectly and uniformly illuminated to provide prints of a high and uniform quality.

Another object of the invention is the provision of an improved device of the class described which necessitates such a manipulation that when the source of illumination is turned on there will be absolutely uniform contact between the papers employed for printing and the barrel.

Another object of the invention is the provision of an improved photographic printing device, the source of illumination of which is automatically controlled, and which is provided with an electric switch so constructed and controlled that a full cylindrical contact is maintained at the curtain, and sufficient torque must be placed upon the barrel in actuating the switch to assure a good curtain and paper contact over all.

Another object of the invention is the provision of an improved construction of the class described in which provision is made to hold the end bar of the curtain substantially tangent with the barrel at the time the source of illumination is turned on, so that the curtain will not be tilted away from the barrel at this end, and so that a good curtain contact is provided up to the end bar of the curtain.

Another object of the invention is the provision of a device of the class described which is so constructed that it may be easily serviced

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with a new electric bulb, and which is provided with means for holding the bulb in its proper position for registry with the contacts when the barrel and bulb are being brought into proper assembly with the supporting base and the energizing contacts.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the drawings, of which there are two sheets,

Fig. 1 is a side elevational view of a photographic printing device embodying the invention.

Fig. 2 is an end elevational view taken from the right end of Fig. 1.

Fig. 3 is a fragmentary sectional view taken on the plane of the line 3—3 of Fig. 2, showing the construction of the barrel and the mode of support of the electric bulb.

Fig. 4 is a wiring diagram.

Fig. 5 is a fragmentary sectional view taken on the plane of the line 5—5 of Fig. 1, looking in the direction of the arrows.

Fig. 6 is a diagrammatic sectional view taken on a plane similar to Fig. 5 and showing the curtain partly unrolled for reception of the printing paper and the subject from which a print is to be made.

Referring to Figs. 1 to 3, 10 indicates, in its entirety, the photographic printing device which consists of a barrel indicated in its entirety at 11, rotatively mounted upon a base 12 and provided with a curtain 13 and a source of illumination 14. The base 12 is preferably constructed out of sheet metal stampings and may consist of a longitudinally extending frame member 15, such as a flat strip of metal.

The frame member 15 is preferably bent upwardly at 16 and 17 at an obtuse angle, and the diagonally and upwardly extending portions 18 and 19 support bearing portions 20, 21. The bearing portions 20, 21 extend substantially parallel to each other when engaging the barrel 11, but the diagonal portions 18 and 19 are preferably resilient, so that they can be bent apart to remove the barrel.

The bearing portions 20, 21 are provided with aligned apertures 22, and each aperture 22 is preferably formed with an inwardly extending tubular portion 23, the outer cylindrical surface 24 of which serves as a trunnion for rotatably mounting the barrel 11 (Fig. 3).

The frame member 15 is preferably provided with a plurality of legs which may be formed by a pair of sheet metal straps 25, 26, each of which is spot-welded to the frame member 15 in a position extending at right angles to the frame

member 15 and midway between the ends of the leg members 25, 26. Thus each leg member 25, 26 may be provided with a central horizontal attaching flange 27, a pair of downwardly and outwardly extending portions 28, 29, and inwardly bent portions 30, 31 which serve to support the feet 32. The frame and ends of the barrel are preferably made of sheet steel, suitably treated to resist corrosion.

The feet 32 may consist of resilient deformable vacuum cup members, each of which has a concavity 33 in its lower surface and a relatively sharp edge 34 which makes a substantially airtight contact with any smooth surface, such as a varnished table top.

The body of each rubber foot 32 preferably has an upwardly extending shank 35 provided with a conically pointed head 36. The head 36 is spaced from the cup 32 by a groove 37. The groove 37 fits in a through aperture 38 in each of the flanges 30, 31. Thus each of the feet 32 may have its head 36 forced through an aperture 38 until the groove 37 registers with the edge of aperture 38, and the head is on the upper side to retain the feet on the frame.

The supporting frame 12 may be supported on a desk or table top by means of the vacuum cups or feet 32 in such manner that it is practically immovable, and this is of some assistance in manipulating the device, particularly when the operator is unrolling the curtain. Also, the device may be placed anywhere without danger of marring the furniture.

The frame member 15 supports, on its lower side, a switch unit 39 (Fig. 2) which may be secured by means of suitable screw bolts, and which has its actuating button 40 projecting through an aperture in the frame member 15 for engagement with an actuating member 41 (Fig. 5) carried by the curtain. This switch unit is preferably of the snap type, but, in any event, of the type which is spring-pressed to open position, and the spring is of sufficient strength and tension so that a positive predetermined force must be applied to it by means of the member 41 to actuate the switch and turn on the bulb 14.

The wiring circuit for this assembly is shown in Fig. 4.

The bulb 14 may consist of an elongated glass envelope 42 provided with a filament 43 extending from end to end and provided with contacts 44, 45 at each end. Each of these contacts is engaged by a spring-pressed contact 46 (Fig. 3) which, in turn, is connected to an insulated conductor 47 or 48. One of the conductors passes through the switch indicated at 39 (Fig. 4), while the other is connected directly to the line at 49, 50.

Thus the switch is in series with the bulb, and illumination is provided only when the switch 39 is closed. The conductors 47, 48 pass down the diagonal portions 18, 19 of the frame and thence to the switch unit 39, from which the line conductors extend.

The tubular portions 23 of the frame members 18 and 19 each support a contact assembly, indicated in its entirety by the numeral 51. Each contact assembly may include a pair of housing members 52, 53.

The housing member 52 is a substantially cylindrical, short tubular member with a radially extending flange 54 which engages the inner edge of the tubular portion 23 on the frame. Housing 52 also has a radially and inwardly extending flange 55 with an annular groove 56 for receiving the edge of the housing 53. Groove 56 is bordered by an annular, axially extending flange 57 which fits inside the housing 53. Housing 53 is a cylindrical cup-shaped member, the cylindrical wall 58 of which fits in the housing 52.

The end wall 59 closes the assembly, but is provided with an aperture 60 for conductor 47 or 48. Aperture 60 is bordered by an inwardly extending annular flange 61 adapted to be received inside the coil spring 62, so that the coil spring is securely seated on housing 53 at the right end.

The contact 46 may consist of a cylindrical metal member which may be stamped, drawn, or made by impact extrusion, and having a cylindrical wall 63 which fits in the apertures 64 of the housing 52. A radially extending flange 65 engages the end of the annular flange 57 on inner housing 52 and limits the motion of the contact toward the left.

The contact 46 has a flat end wall 66 which is engaged on the inside by the spring 62, so that the contact is slidably mounted in the assembly for axial movement, but is spring-pressed against the bulb. The end wall 66 may be formed with a reduced cylindrical portion 67 which fits inside a circular recess 68 in the contacts 44 or 45 of the bulb.

Thus the contact is adapted to hold the bulb in centered position, but the bulb may be caused to rotate with the barrel or drum by reason of the engagement of the fingers 76 with the bulb. The resiliency of the frame is such that the diagonal portions 18 and 19 of the frame may be sprung apart sufficiently to remove the barrel from its frame.

The barrel 11 consists of a pair of end members 69, 70. These, like the parts of the frame, may be made of aluminum or other sheet metal stampings which are preferably plated afterwards with chromium or some other form of coating, presenting a bright, finished appearance, and having non-corroding characteristics.

Each end member 69, 70 preferably has a short cylindrical supporting flange 71 for holding the translucent side wall 72 of the barrel. The cylindrical portion 71 is supported by a radially extending flange 73 which, in turn, is carried by another annular portion 74.

The annular portion 74 is integrally joined to a curved portion 75 which is of such shape that a plurality of fingers 76 may be conveniently punched from it and used in substantially the same shape. The curved portion 75 is carried by a cylindrical tubular portion 77 which, in turn, has a radially inwardly extending flange 78 with an aperture 79. The aperture 79 serves as a bearing for rotatably supporting the barrel on the tubular part 23 of the frame.

The holes which are left by punching in the fingers 76 at 80 may be closed against white light leakage by means of a strip of translucent colored plastic 81 wide enough to overlap the aperture and long enough to fit in between fingers 76 and an inwardly pressed tab 82. The fingers 76 and tab 82 extend in such a direction that they retain the plastic window 81 in place. Thus the end of the barrel will be closed against passage of stray white light, which might affect developing operations.

The side wall 72 of the barrel may be constructed of a rectangular sheet of a suitable translucent plastic. This sheet is bent into the shape of a cylinder and has its abutting edges 83 secured together by inner and outer partially cylindrical sheet metal bars 84, 85 and through rivets 86

which pass through the two bars and the side wall 72, and also through the curtain 13, thus securing the curtain to the cylindrical barrel.

The translucent side wall 72 engages the outside of each cylindrical portion 71 of the two end members to which it is secured, in such manner as to prevent escape of light, by cylindrical metal clamping band 87 and a plurality of screw bolts 88 or self-tapping screws which pass through apertures in the band 87 and side walls 82 and are threaded into the flanges 71 of end members 69 and 70.

The curtain is of sufficient width to overlap the flange 71 at each end, thus assuring complete enclosure of the translucent side wall 72 by means of the curtain and preventing escape of stray white light which might fog photographic sensitized paper adjacent to the machine.

The outer bar 84 (Fig. 5) is preferably of sufficient length to abut against the clamping bands 87 on each end member 69 or 70, but the inner clamping bar 85 preferably abuts against the edges of the flange 71. Thus these bars clamp only the curtain and translucent side wall together by means of a plurality of rivets or self-tapping screw bolts.

The curtain 13 consists of a substantially rectangular sheet of imitiation leather, oil cloth, or other flexible, opaque sheet material, preferably disposed with its finished side outward. The width of the curtain 13 is sufficient to effect a complete enclosure of the translucent side wall 72 overlapping the flanges 71.

The length of the curtain 13 is sufficient to extend completely about the translucent cylindrical wall 72 and leave an end portion projecting tangentially with respect to the cylinder. This projecting end portion is preferably reinforced and covered by a sheet metal end bar 89 consisting of a strip of sheet metal bent back on itself at 90 to provide two parallel flanges between which the end portion of the curtain 13 is clamped.

End bar 89 is secured to the curtain 13 by a plurality of through rivets, and one of the rivets is provided with a radially extending post 91. The post rivet 91 passes through an aperture in the switch actuating member 41 which consists of a curved strip of sheet metal extending backwardly along the curtain 13. The bottom frame member 15 is also provided with a downwardly sloping camming surface 92 (Fig. 1) to make sure that the actuating member 41 will not catch below the frame member 15.

The operation of this portion of the device is as follows: The curtain 13 is unrolled, as shown in Fig. 5, by simply pulling on end bar 89 with the fingers of one hand. Then the sheet of print paper and the subject of which a print is to be made, with or without a filter sheet, is placed on the inside of the curtain 13, as shown in Fig. 6. Then the fingers of the two hands are used to rotate the barrel by applying the fingers to the end members 69 and 70 until the curtain and papers are completely rolled on the barrel.

The switch actuating member 41 will strike the camming surface 92 and pass between the frame member 15 and the barrel. When the post 91 strikes the edge of the frame member 15, continued tension on the curtain, which is caused by twisting the barrel with the hands, will cause the post 91 to slide upward and the right end of the actuating member 41 to press downward. This downward pressure is exerted against the switch button 40, closing the switch which energizes the bulb 14.

The switch button 40, being spring-loaded with the proper force, will not close until the curtain is properly tensioned around the drum, thereby insuring the proper contact between the print paper and the subject being printed. This insures a sharp, clear print of the original.

The bulb 14 can only be energized when sufficient torsion is exerted on the barrel by means of the hands, and when this torsion is impressed upon the barrel, the curtain 13 and papers enclosed by it will be held in perfect contact with the translucent side wall 72. Furthermore, the endmost portion of the curtain 13 near the end bar 90 will be driven upward by the upward sliding action of the post 91 into firm and uniform contact with the translucent side wall 72. A complete and uniform contact is thus assured over the complete area of the cylinder during the time when the bulb is energized.

The fingers 76 are preferably three in number at each end of the barrel, and they are bent in far enough so that they resiliently engage and support the bulb 14 in centered position. In order to permit convenient insertion of the bulb these fingers have an outwardly turned camming surface 93.

Thus the device may be serviced with a new bulb as follows: The arms 18 and 19 of the frame are sprung apart until they are spread far enough for the barrel to have one of its ends removed from the bearing flange 23 and far enough to clear the contact 46.

The barrel having been removed from the frame, the bulb is still held by the fingers 76. The bulb may be pushed outward by inserting a finger of the hand in one end and pushing the bulb until it can be grasped with the other hand. A new bulb may then be slid into place and held in centered position by the fingers 76. Then the barrel may have one end placed upon its trunnion, and the arms 18 and 19 may again be sprung apart far enough to permit the contact 46 to clear the adjacent end member 69 so that the barrel can be swung over into axial position. Release of the arms 18 and 19 of the frame will then permit them to move in to support the barrel for rotation in the position of Fig. 1.

It will thus be observed that I have invented an improved photographic printing device which, by virtue of its use of substantially the full cylindrical surface, provides a maximum printing area in a minimum space. Since the cylindrical barrel surface is an equal distance from all the parts of the illuminating bulb, which itself has a translucent envelope, substantially uniform illumination is provided, and since the bulb extends even beyond the ends of the translucent side wall, uniform illumination is provided to the very ends of the side wall.

Although the present device may be constructed so cheaply that it may be sold in some instances as a toy, it is also of general application, and may be used commercially for making copies of anything, up to letter size.

It should also be noted that the present device may be made in different sizes.

The cost of the present device is maintained at a minimum because the parts may all be made by stamping operations. There is a minimum number of parts, and the device is simple to operate and easy to manipulate. Perfect contact between the print paper, the subject, and the

barrel is assured at the moment when the bulb is illuminated by means of my improved switch actuating arrangement, which necessitates the placing of a predetermined tension on the curtain, and also drives all parts of the curtain into tight engagement with the barrel.

The present device is also easy to service in regard to the replacement of the bulb.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

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

1. A barrel unit for phonographic printing equipment comprising a pair of end closure members having a cylindrical supporting flange, a side wall for the barrel comprising a sheet of translucent, non-metallic material overlapping said flange and secured thereto, and means for securing together the abutting ends of said sheet to form a closed cylinder, said end closures being formed with centrally located bearing apertures whereby the barrel may be supported for rotation, each of said closures having a plurality of fingers punched out of its body and extending inwardly in position to engage the envelope of an elongated bulb whereby the bulb is held in centered position in the barrel for assembly with a support.

2. A barrel unit for photographic printing equipment comprising a pair of end closure members having a cylindrical supporting flange, a side wall for the barrel comprising a sheet of translucent, non-metallic material overlapping said flange and secured thereto, means for securing together the abutting ends of said sheet to form a closed cylinder, said end closures being formed with centrally located bearing apertures whereby the barrel may be supported for rotation, each of said closures having a plurality of fingers punched out of its body and extending inwardly in position to engage the envelope of an elongated bulb whereby the bulb is held in centered position in the barrel for assembly with a support, the openings being formed with retaining flanges, and a partially opaque closure for said openings comprising a sheet of bendable material held by said retaining flanges.

3. In a photographic printing device, the combination of a supporting frame comprising a base and a pair of upwardly extending arms, each of said arms carrying a trunnion, and said trunnions being aligned, with a rotatable, translucent barrel, said barrel comprising a pair of end members, each end member being formed with a bearing for engaging a trunnion, and said end members being joined by a substantially cylindrical, translucent sheet secured to the end members, with its edges in abutting relation, an opaque sheet of sufficient length to overlap and enclose the cylindrical, translucent sheet, said opaque sheet having one of its edges secured to an element of the cylindrical sheet and being arranged to wrap around the cylindrical, translucent sheet, to effect a complete enclosure of the cylindrical, translucent sheet, a source of illumination carried by said trunnions and extending from trunnion to trunnion, and an electrical switch carried by the frame and have an actuating member projecting toward said barrel, and a flexibly mounted controlling member carried by the free end of said opaque sheet in position to engage said switch actuating member when the opaque sheet is completely wrapped about the cylindrical, translucent sheet, said controlling member having a stop for engaging the frame, and said controlling member being urged into engagement with the switch actuating member by a pivotal movement on the engaging point of the stop as a pivot, by tension of the opaque sheet on the controlling member, exerted by turning the barrel further in the wrapping direction, said controlling member comprising a backwardly extending strip of metal carried by a cross bar mounted on the end of said opaque sheet.

4. In a photographic printing device, the combination of a supporting frame comprising a base and a pair of upwardly extending arms, each of said arms carrying a trunnion, and said trunnions being aligned, with a rotatable, translucent barrel, said barrel comprising a pair of end members, each end member being formed with a bearing for engaging a trunnion, and said end members being joined by a substantially cylindrical, translucent sheet secured to the end members, with its edges in abutting relation, an opaque sheet of sufficient length to overlap and enclose the cylindrical, translucent sheet, said opaque sheet having one of its edges secured to an element of the cylindrical sheet and being arranged to wrap around the cylindrical, translucent sheet, to effect a complete enclosure of the cylindrical, transculent sheet, a source of illumination carried by said trunnions and extending from trunnion to trunnion, and an electrical switch carried by the frame and having an actuating member projecting toward said barrel, and a flexibly mounted controlling member carried by the free end of said opaque sheet in position to engage said switch actuating member when the opaque sheet is completely wrapped about the cylindrical, translucent sheet, said controlling member having a stop for engaging the frame, and said controlling member being urged into engagement with the switch actuating member by a pivotal movement on the engaging point of the stop as a pivot, by tension of the opaque sheet on the controlling member, exerted by turning the barrel further in the wrapping direction, said controlling member comprising a backwardly extending strip of metal carried by a cross bar mounted on the end of said opaque sheet, and said switch actuating member comprising a push button projecting through an aperture in the frame below said controlling member.

JOSEPH HENRY DE LACY.

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