March 3, 1959 R. M. ELLIS 2,875,677

PHOTOGRAPHIC-PRINTING APPARATUS

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Fig. 1.

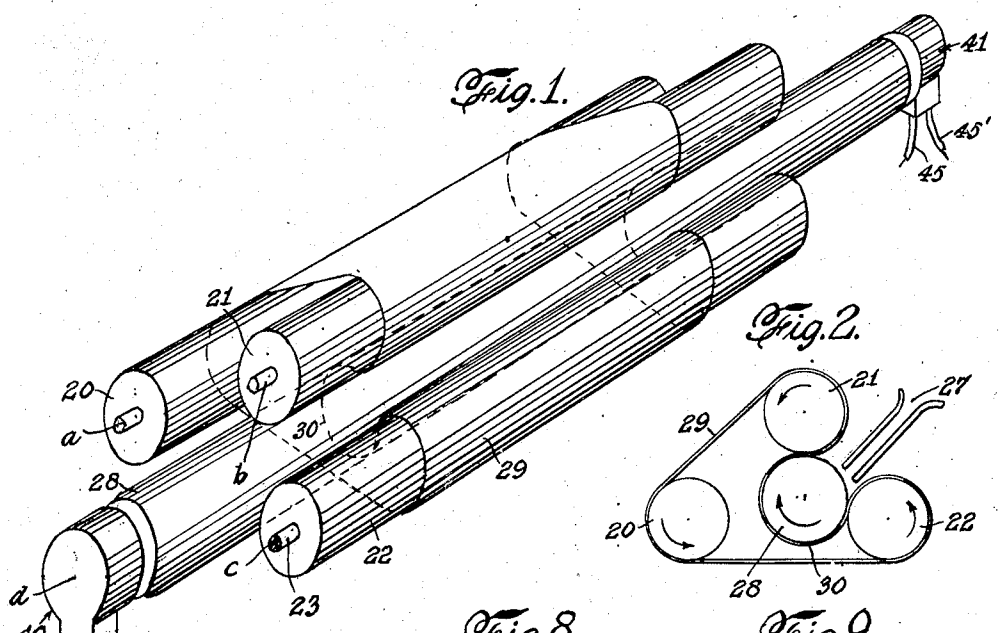


Fig. 2.

Fig. 8.

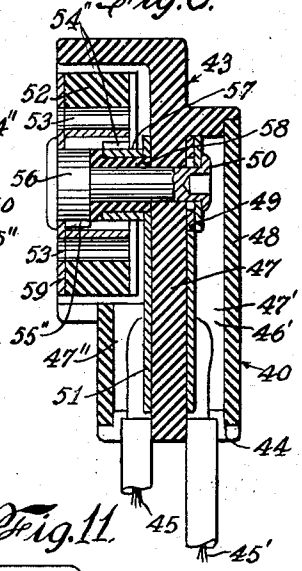


Fig. 9.

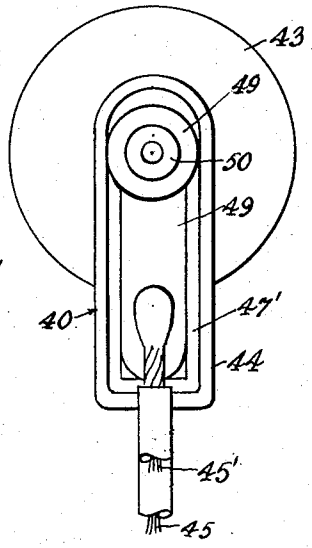


Fig. 7.

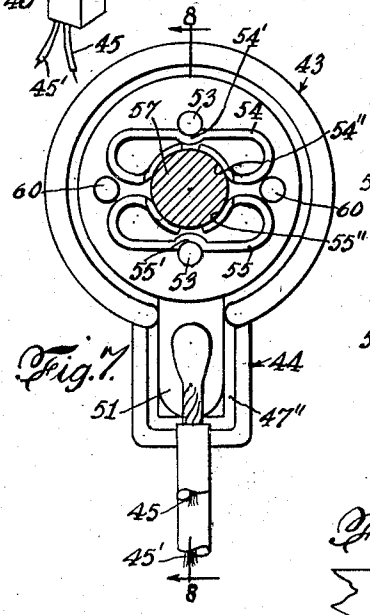


Fig. 11.

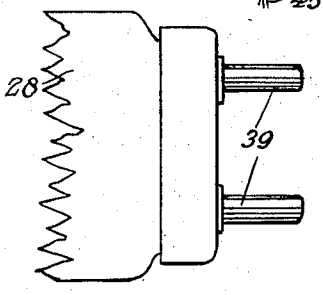
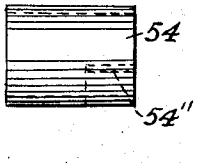


Fig. 10.



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Fig. 3.

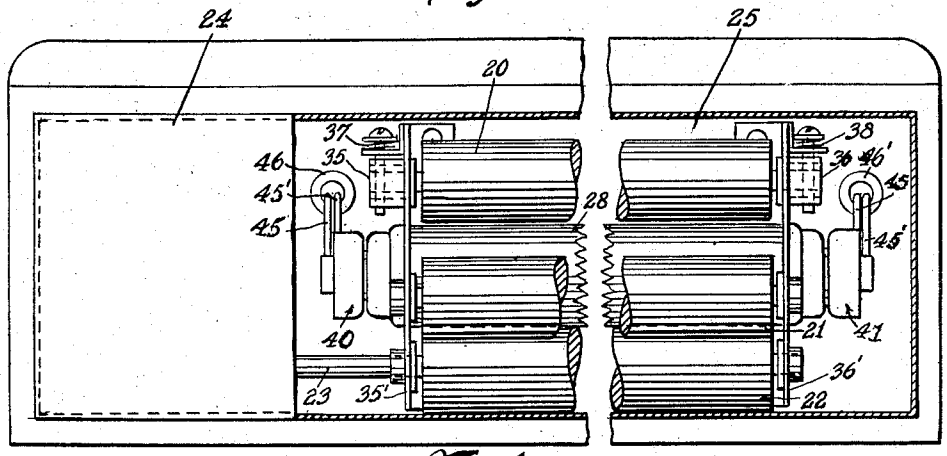


Fig. 4.

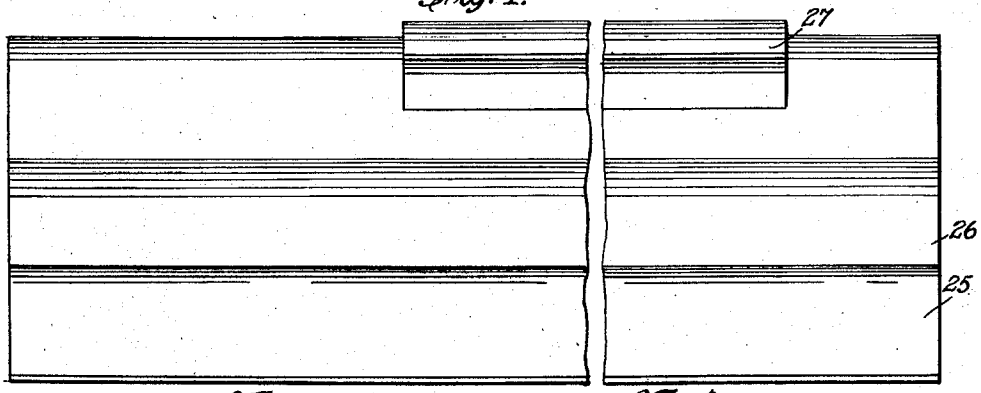


Fig. 5.

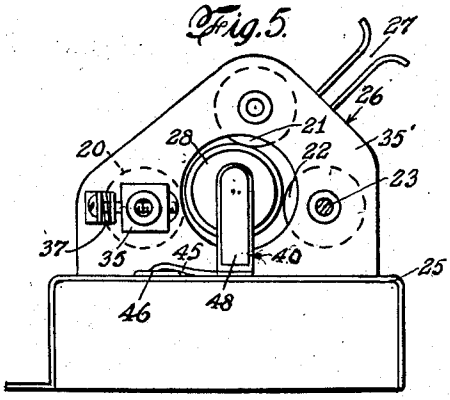
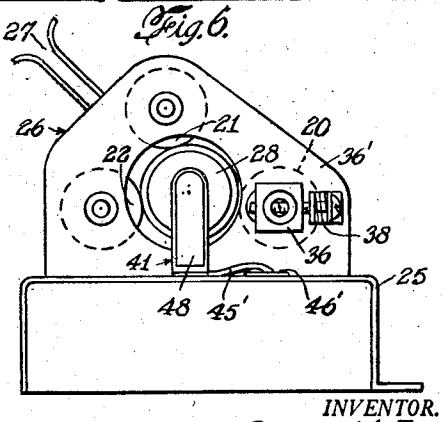


Fig. 6.



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PHOTOGRAPHIC-PRINTING APPARATUS

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Application May 21, 1954, Serial No. 431,377

4 Claims. (Cl. 95—77.5)

The invention relates to photographic printing apparatus suitable for the rapid reproduction of drawings, typewritten matter and the like, made on translucent material and adapted for exposure with associated light-sensitive material to light, said material being, for example, of the dry development type. More particularly, it relates to apparatus comprising a source of illumination, generally a tubular lamp of the fluorescent type, associated with an endless travelling belt for advancing copy together with a light-sensitive paper or cloth for exposure of the latter to said source of illumination, and delivery of the exposed paper or cloth conveniently for the developing operation. I am aware that it has been proposed, in such apparatus, to support freely a rotatable, transparent printing cylinder in a depending or loop portion of the endless belt and associate it with one or more guide rolls, and a power-driven roll to impart rotation frictionally to the printing cylinder. The latter has fixedly mounted therein a lamp, the light of which passes through said rotatable, transparent cylinder to the sensitized paper or cloth and intermediate copy as they are advanced over a portion of the surface of said cylinder.

Contrary to this procedure, the novel construction dispenses with the generally accepted printing cylinder, as aforesaid, and utilizes directly the lamp as the movable printing surface, said lamp to this end being supported similarly by the belt and at its ends having introduced the power through suitable floating elements so as to accommodate the required displacements. Also, provision is made to maintain continuously the electrical connection, from an external source, to the rotating lamp for securing illumination therefrom.

It is an object of the invention, therefore, to provide printing apparatus of the aforesaid nature which will be of a more compact construction and may be manufactured and operated at much lower cost.

A further object of the invention is to provide an assembly wherein irregularities in the lamp surface will readily be accommodated by novel support means for the lamp, so that, in addition to dispensing with the conventional lamp-containing cylinder, the necessity for accurate surface finish of contact surfaces is eliminated.

A still further object of the invention is to provide a construction of printing apparatus wherein the actual light source is locatable in much closer proximity to the work than has been heretofore possible, thus permitting of operation with substantially less power for the light production required, as well as resulting in more rapid and improved printing action.

The invention has for an object, also, a novel mounting for the lamp whereby the same may freely rotate and through which also it is energized.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view illustrating the general arrangement of rolls and lamp-printing-cylinder.

Fig. 2 is a diagrammatic view.

Fig. 3 is a plan view of the printing apparatus with housing broken away and apron removed.

Fig. 4 is a front elevation of the novel printing apparatus.

Figs. 5 and 6 are elevational views of opposite ends thereof.

Fig. 7 is an elevational view and part section, on an enlarged scale, of the face of one of the lamp mounting heads, with cover plate removed.

Fig. 8 is a vertical section through the said head, taken on the line 8—8, Fig. 7, with cover plate in position.

Fig. 9 is an elevational view of the opposite face of the head.

Fig. 10 is an elevation of a brush element of the head.

Fig. 11 is a fragmentary elevational view, on an enlarged scale, showing the lamp and electrical connection means for energization of said lamp.

Referring to the drawings, more particularly Figs. 1 and 2 thereof, a plurality of rotatable rolls **20**, **21** and **22** are mounted for rotation, as hereinafter set forth, about horizontal parallel axes *a*, *b* and *c*, respectively, one of said rolls, as the roll **20**, being designed for displacement away from the remaining rolls **21**, **22** to serve as a tensioning roll. Another of these latter rolls, for example the roll **22**, is caused to be positively rotated through shaft **23**, by suitable driving mechanism contained within a housing **24**, Fig. 3. The whole mechanism aforesaid is mounted upon a base or container **25** and is enclosed within a further housing **26**, Fig. 4, which is provided with a feed trough **27** through which copy and sensitized material is to be fed in the conventional manner to a printing roll **28**. An endless band or apron **29** is threaded over the various rolls for rotating the printing roll by causing it to contact said remaining rolls **21**, **22**, the latter of which initiates the rotation.

In the instant embodiment, the printing roll **28**, which is surrounded by the guide and driving rolls and mounted for rotation about an axis *d* parallel to axes *a*, *b* and *c*, floats by suspending it in a loop portion **30** of the band (Fig. 1); but, contrary to conventional procedure, is also the lamp which constitutes the source of illumination for printing. Such lamp is preferably of the well-known fluorescent type.

The tensioning roll **20** is journalled slidably at its opposite ends in suitable brackets **35**, **36** for lateral displacement over base **25** under the action of retractile springs **37**, **38**, respectively, as is well understood in the art. The remaining rolls **21**, **22** are journalled in end plates **35'**, **36'** provided to extend upwardly from the base **25**.

Provision is made in mounting the printing roll to accommodate displacements of the said roll in its suspension, as well as such as may result from the action of surface irregularities thereof; also, to secure adequate electrical connection to the lamp-printing roll for energization of the lamp when printing is to be effected. Thus the respective ends of roll **28** are provided with a contact pin or pairs of contact pins **39** which extend therefrom parallel to the longitudinal axis of the roll. Said pins constitute the terminals of the lamp and serve at the same time as attaching means for mounting the said roll in circuit.

Reference being had to Figs. 7 to 10, inclusive, a pair of similar mounting brackets **40**, **41** are provided, the same being directed upwardly from the base **25** respectively at opposite ends thereof (Figs. 5 and 6). Each bracket comprises an upper mounting portion **43** and a lower portion **44** through which latter the electrical conductors **45**, **45'** are introduced. The latter are designed to pass through respective insulating sleeves **46**, **46'** secured in the top of base **25** to serve as a flexible support for a bracket.

A vertical wall 47 of insulation material separates a bracket into an outer compartment 47', closed by a removable plate 48, and an inner compartment 47''. The compartment 47' contains a terminal strip 49 secured to wall 47 by a stud 50; and to the said strip one of the pair of power conductors as the conductor 45' is connected.

A similar terminal strip 51 is attached to wall 47 at its opposite face within the inner compartment 47''; and the other conductor 45 of the pair is connected thereto. Stud 50 affords a support for a rotor member 52 upon which stud it is freely rotatable, said rotor member having diametrically opposed open-ended sockets 53 to receive the respective pairs of pins 39 of the lamp (roll) 28 which are to be inserted therein for mounting of the lamp and introduction of the operating power thereto. The said pins, however, do not bear directly on the wall of the socket openings but rather on resilient brushes 54, 55 which are oppositely disposed on the rotor and are depressed to form seats 54' and 55' for the respective pins. These brushes in turn through end lips 54'' and 55'' are in electrical connection respectively with the corresponding strips 51 and 49 through slip rings 56, 57, respectively, in electrical contact with said strips. The said slip rings are mounted along the stud 50, respectively at its inner end and over an insulating sleeve 58 of said stud. A perforated disk or shield 59 closes the brush compartment, and is removably fitted over a corresponding pair of projections 60 directed outwardly from the rotor 52.

The hereinbefore described mounting admits of ready replacement of a lamp when this becomes necessary and at the same time the mounting of such lamp is such that it readily accommodates itself to surface irregularities of the lamp when in operation.

I claim:

1. In photographic-printing apparatus: the combination with at least three rotatably mounted guide rolls having their rotational axes disposed horizontally parallel to one another, one of the rolls being displaceable and movably tensioned away from the remaining rolls; means to rotate one of the remaining rolls; and an endless band threaded about the rolls; of a displaceably mounted, cylindrical printing lamp adapted to rotate freely about an axis parallel to the said rotational axes, said lamp being surrounded by the guide rolls, freely suspended in a depending loop portion of said endless band and urged thereby directly into contact with the said remaining rolls to rotate therewith; means to guide copy and light-sensitive material between the belt and the lamp for direct contact with the latter; and means for detachably and flexibly connecting the lamp to a source of electrical power.

2. Photographic-printing apparatus according to claim 1, wherein the detachable means are carried by the lamp to accommodate its displacements.

3. Photographic-printing apparatus according to claim 1, wherein slip-ring housings are provided respectively at opposite ends of the apparatus and retain rotatable socket members for affording removable attachment to the rotatable lamp of said housings, and power leads are provided and flexibly connected to said slip-ring housings for energization of the lamp when the same is mounted in said housings.

4. In photographic printing apparatus: means for suspending a rotatable, tubular, electric printing lamp freely displaceable in directions transverse to its length, the lamp having means at its respective ends for effecting pin-terminal connection thereto for introduction of electrical power to said lamp; a pair of connectors adapted to be suspended from the lamp respectively at its opposite ends and each connector including a stud extending therefrom for receiving coaxially therebetween said lamp; slip ring means along the respective studs, and flexible conductors respectively connected thereto, passing through the corresponding connectors for external electrical connection; a rotor member mounted on each of the studs about the slip rings; and a pair of brush members carried by the rotor member and rotatably cooperating electrically with the lamp pin-terminal connection-effecting means and with the said slip rings.

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