Aug. 15, 1939. M. C. MILLER 2,169,272

TEXTILE MACHINERY

Filed Feb. 16, 1938

Fig. 2

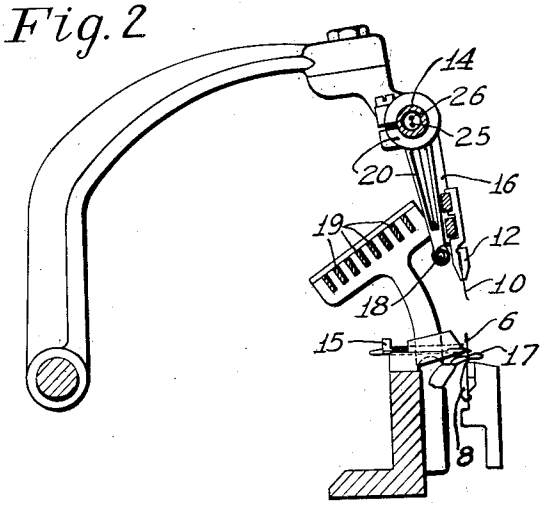


Fig. 3

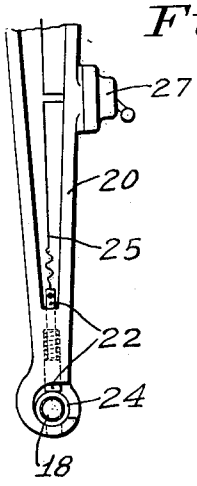


Fig. 1

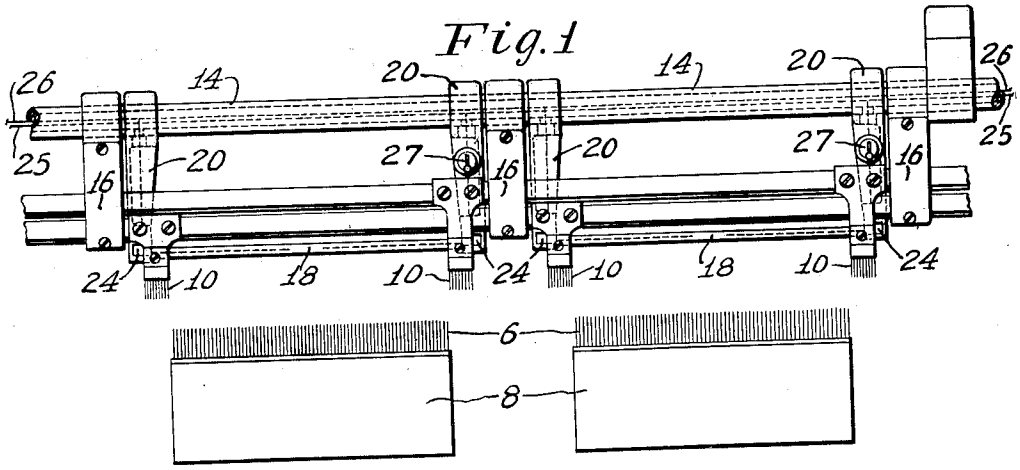


Fig. 4

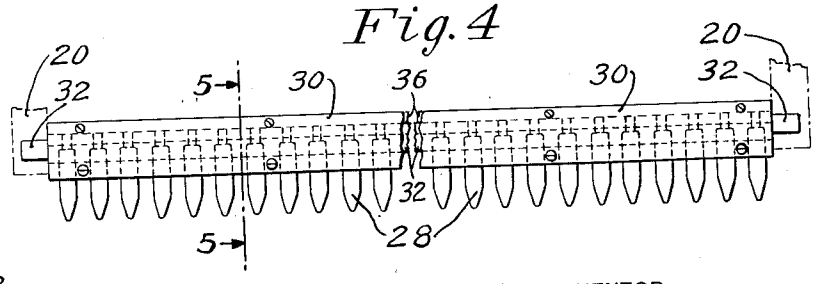
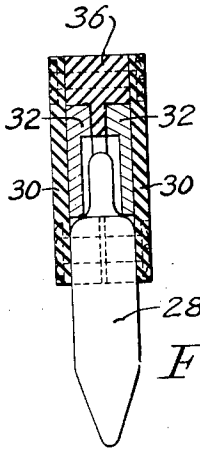


Fig. 5



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TEXTILE MACHINERY

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Application February 16, 1938, Serial No. 190,775

8 Claims. (Cl. 66—82)

The present invention relates to improvements in textile and similar machinery having a large number of small closely adjacent parts of identical size and shape, and more particularly to means for providing adequate illumination thereof. The invention is herein disclosed in a preferred form as embodied in a flat full-fashioned knitting machine for the lighting of the needle series and related parts. It will be understood, however, that the invention in its broader aspects is not to be limited in its application to a machine of this particular type, but is equally applicable to secure an improved lighting of textile machines of other types having a large number of closely adjacent identical parts of fine gauge such, for example, as comprised by the heddles, reeds and other supporting elements for the warp threads of looms and the like, employed in the manufacture of woven fabrics.

It is essential in machines of this type having a large number of closely adjacent parts of fine gauge, that the parts be illuminated in such a manner as to enable the operator readily to distinguish one from another for the purpose of performing various manual operations relating thereto. While attempts have been previously made to secure an adequate illumination of such parts by the location of concentrated sources of light in close proximity to the parts, such attempts have not been successful in eliminating cross lighting or shadow effects which tend to blur the vision of the operator, and to render it exceedingly difficult to distinguish any particular part from the parts closely adjacent thereto.

The principal object of the present invention is to provide a system for illuminating textile and other machines, which is particularly adapted for lighting in a novel and improved manner a series of closely adjacent identical parts of small gauge, whereby each part may be evenly and clearly lighted with the same kind and intensity of illumination as every other element, and without either cast shadows or reflections from adjacent elements.

It is more specifically an object to provide a system for illuminating knitting machines having a light source which is so positioned with relation to the needles and associated elements, as to provide improved illumination of the desired elements without the use of a high intensity source of light, and without interfering with the operation of the machine or visibility of the parts.

With these and other objects in view, a feature of the invention consists in the provision of a continuous or substantially continuous light source which is positioned in close proximity to the series of parts to be illuminated, and extending the length of said series, the light source being adapted to emit light with substantial uniformity along its length for affording even and shadowless illumination to each individual part.

More specifically, another feature of the invention consists in the provision in a full-fashioned knitting machine, of a light source comprising, in one embodiment of the invention, a tubular light source extending substantially the length of the needle series and either of the incandescent filament or the gaseous electrical discharge type, and in an alternative embodiment, a plurality of small closely-spaced light sources of either of the above types arranged in a row the length of the needle series, the light source in either embodiment being preferably supported from the narrowing frame of the machine in close proximity to and more or less directly over the needle series, thus concentrating the illumination in the plane of the needles to afford shadowless lighting of said elements.

In the drawing illustrating the preferred form of the invention, and a modification thereof, Fig. 1 is a view in front elevation of two sections of a multiple section flat full-fashioned knitting machine embodying the illuminating system of the invention; Fig. 2 is a detail view in side elevation, partly in section, showing the position of the light source with relation to the knitting instrumentalities; Fig. 3 is a detail view of the lower end of the light source supporting bracket, showing the connector arrangement; Fig. 4 is a view in front elevation of a modified form of lighting unit for use in the lighting system of the invention; and Fig. 5 is a detail sectional view on an enlarged scale of the modified form of lighting unit taken on the line 5—5 of Fig. 4.

The portion of the machine illustrated in Figs. 1 and 2 is representative of the other sections, and is provided with the usual knitting instrumentalities comprising needle series 6 mounted in needle bars 8, narrowing points 10 carried by the narrowing point bars 12 supported from the narrowing frame shaft 14 by brackets 16, and other parts not illustrated for the sake of simplicity, but whose nature and arrangement will be readily understood by those skilled in the art.

The knitting elements, and particularly the needle series 6, the sinker series 15 and the knockover series 17, are effectively illuminated by means of a light source 18 positioned above and in close proximity to the needle series. The light source is preferably of the tubular type,

and extends substantially the length of the needle series, one light or tube being employed for each section of the machine. The lighting units may be of the gaseous electrical discharge type, such as the neon-filled tube with traces of other inert gases for imparting proper color to the discharge, or of the tubular incandescent filament type. In the case of the gas filled tube, the usual step-up transformer, not shown, is employed to supply electricity of the proper voltage, while the incandescent filament type may be connected directly to the lighting circuit in accordance with conventional practice.

To enable the light source to be positioned as near the needle series as possible without interference with either the operation or the visibility of the knitting elements, the light is preferably carried by the narrowing frame, being positioned to the rear of the narrowing points 10 and in front of the yarn carrier bars 19 and the traversing carriers, not illustrated. As shown in the drawing, the ends of the tube 18 are received in the lower ends of brackets 20 depending from the narrowing frame shaft 14, adjacent the brackets 16 for the narrowing point bars. The brackets 20 are preferably nonmetallic for insulating purposes, and to facilitate the removal and replacement of the lighting units are provided with contact members 22 for engaging ferrules 24 provided at opposite ends of the tubes and connected to the filament or discharge electrodes of the light unit. The contact members in the supporting brackets are connected to a source of electricity by supply and return wires 25 and 26 enclosed within the hollow narrowing frame shaft 14, a switch 27 being mounted in one of the brackets 20 for controlling the light for each section.

Where it is desired to employ such lighting only for purposes of inspection and repair of the individual sections, it will readily be seen that a single light unit may be employed which is readily plugged into the holder associated with the particular section to be repaired, and then removed or transferred as needed by the operator for the repair of other parts of the machine.

An alternative embodiment of the invention is illustrated in Figures 4 and 5, and involves the use of a light source comprising a plurality of closely-spaced low-intensity lights 28 arranged in a row suspended from the narrowing frame above and extending the length of the needle series. The lights may be either small neon tubes or the usual filament type, and are clamped between fiber side members 30 which enclose the conductor bars 32 extending the length of the row to which the lamps are connected. The conductor bars are spaced apart by a fiber bar 36 to which the side members 30 are attached. The bars 30 are extended one at one end of the row and the other at the opposite end, and are adapted to fit into the ends of the supporting brackets 20 and make connection with the contacts 22 through which electricity is supplied to the lighting units.

In the above described lighting systems the arrangement of light source extending the length of the needle series and emitting light of substantially uniform intensity throughout its length results in the illumination of each element of the needle series with light of the same intensity and angular distribution as every other element of the series. Since, for each element, the major portion of the light received by it comes from directly above the element, there are neither shadows nor reflections from adjacent elements to interfere with the clarity with which the operator may perceive and adjust the elements. Likewise, the spaces between the needles are clearly lighted so that the operator of the machine may quickly detect the presence of foreign matter which would interfere with the proper operation of the machine.

A further advantage of the illumination system described and resulting from the particular shape and placement of light source is that the intensity of light per unit of length of the source may be relatively low, the substantially continuous emission of light throughout the entire length of the source affording a comparatively large total light emission. For this reason, there is no necessity for shielding the light from the eyes of the operator as is the case where the usual concentrated light sources are employed.

While the invention has been illustrated and described as embodied in particular forms and arrangements, it will be understood that the invention is not limited thereto, but may be embodied in other constructions and arranements within the scope of the appended claims.

Having thus described the invention, what is claimed is:

1. In a flat full-fashioned knitting machine, an illuminating system comprising supporting means on the machine, and a source of light supported thereon above and extending substantially the length of the needle series for even and shadowless illumination of the same.

2. In a flat full-fashioned knitting machine, an illuminating system comprising supporting means on the machine, and a source of light supported thereon above and in close proximity to the needle series and extending the length thereof, and adapted to emit light with substantial uniformity throughout its length for even and shadowless illumination of each element of the needle series.

3. In a flat full-fashioned knitting machine having a needle series and a narrowing frame, an illumination system comprising a light source mounted on the narrowing frame in close proximity to and substantially in the vertical plane of the needle series and extending at least the length thereof, said source being adapted to emit light with substantially uniform intensity throughout its length whereby each element of the needle series may receive illumination of the same kind and intensity as every other element of the series.

4. In a flat full-fashioned knitting machine having a needle series and a narrowing frame, an illumination system comprising a light source of the tubular gaseous electrical discharge type mounted on the narrowing frame in close proximity to and substantially in the vertical plane of the needle series, and extending at least the length thereof, said source being adapted to emit light with substantially uniform intensity throughout its length whereby each element of the needle series may receive illumination of the same kind and intensity as every other element of the series.

5. In a flat full-fashioned knitting machine having a needle series and a narrowing frame, an illumination system comprising a light source of the tubular incandescent filament type mounted on the narrowing frame in close proximity to and substantially in the vertical plane of the needle series, and extending at least the length thereof, said source being adapted to emit light with substantially uniform intensity throughout its length whereby each element of the needle series may

receive illumination of the same kind and intensity as every other element of the series.

6. In a flat full-fashioned knitting machine having a needle series and a narrowing frame, an illumination system comprising a light source comprising a plurality of closely spaced individual light sources arranged in a row mounted on the narrowing frame in close proximity to and substantially in the vertical plane of the needle series, and extending at least the length thereof, said source being adapted to emit light with substantially uniform intensity throughout its length whereby each element of the needle series may receive illumination of the same kind and intensity as every other element of the series.

7. In a flat full-fashioned knitting machine having a needle series and a narrowing frame, an illumination system comprising a source of light extending substantially the length of the needle series, members depending from the narrowing frame for supporting the light source above and in proximity to the needle series, and electrical contacts in said members for connecting the light source to a supply of electricity.

8. In a flat full-fashioned knitting machine having a needle series and a narrowing frame including a hollow longitudinally extending and vertically movable shaft, an illuminating system comprising a source of light extending substantially the length of the needle series, members depending from said narrowing frame shaft for supporting the light source above and in proximity to the needle series, and electrical supply and return connections supported within said hollow shaft and including electrical contacts in said members for connecting the light source to said supply and return wires.

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