

J. B. TAYLOR.
PROJECTION APPARATUS.
APPLICATION FILED JUNE 23, 1915.

1,213,974.

Patented Jan. 30, 1917.

Fig. 1.

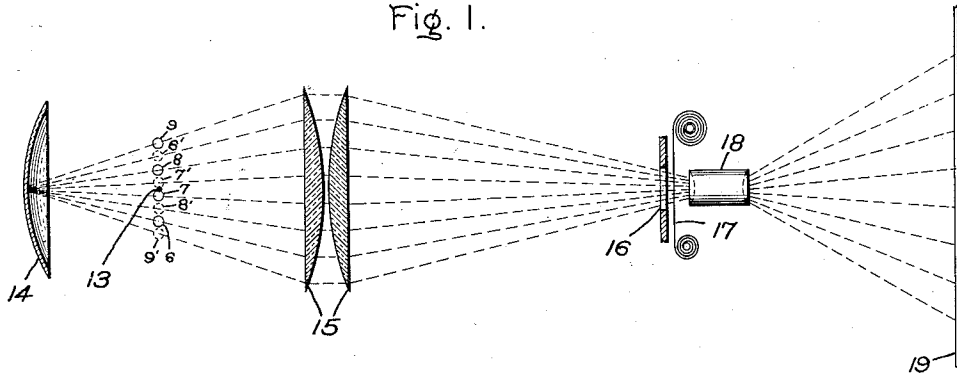


Fig. 2.

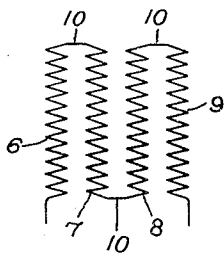


Fig. 4.

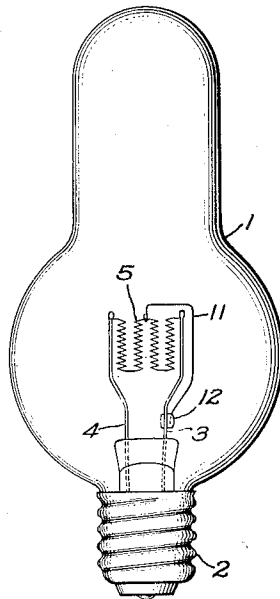
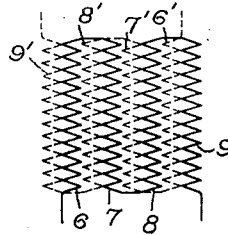


Fig. 3.



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UNITED STATES PATENT OFFICE.

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PROJECTION APPARATUS.

1,213,974.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN B. TAYLOR, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Projection Apparatus, of which the following is a specification.

My present invention relates to projection apparatus and especially to incandescent lamps adapted to utilization with such apparatus.

The object of my invention is to provide an incandescent lamp of special construction and so to arrange it in relation to other apparatus employed therewith that it will provide a concentrated source of light of substantially uniform intensity which will be suitable for projection and similar purposes.

One of the principal requirements for a light source for projection purposes is that it shall be of high intensity and concentrated in a small area. Another requirement is that the intensity of the light shall be substantially uniform throughout the entire area of the light source. Heretofore an electric arc has been commonly employed because of the fact that it furnishes a concentrated source of light of high intensity and one which gives substantially uniform illumination over the area on which it is projected.

Incandescent lamps as heretofore constructed have not been suitable for projecting apparatus because they have been lacking in the principal requirements above stated. The light emitted by vacuum lamps employing the usual straight filaments of carbon or tungsten is not of sufficient intensity and is scattered over too large an area to be employed successfully for this purpose. In lamps having a filling of inert gas the metal filament may be operated at a much greater intensity. When the filament is coiled or spiraled according to the usual construction in such lamps the source of light is also much more concentrated. If the coils or spirals are fairly close together the effective light emitting area in any direction is practically the same as that of a flat filament whose width is equal to the diameter of the coils. As heretofore constructed however such lamps have not been

entirely satisfactory for some purposes, such, for example, as for the operation of moving picture apparatus. If the usual looped filament of V-shape is used the image of the filament will appear on the screen as a V-shape streak of light of much higher intensity than the remaining portions of the screen and if a reflector is used behind the light source the reflected image will appear on the screen as another V-shaped streak of light of comparatively high intensity, inverted with respect to the direct image. I have found, however, that by constructing a lamp in which the coiled filament is divided up into a plurality of sections parallel to each other and all in the same plane, the distance between adjacent sections being about equal to the diameter of the coil the above mentioned difficulty may be overcome and a substantially uniform illumination of the screen obtained. In securing this result the lamp should be so adjusted with respect to a reflector that the reflected image of the filament sections will fall on the screen between the direct images and the only streaks which can be observed on the screen under any condition will be due to the difference in intensity of the direct and reflected images. With an efficient reflector these differences are not in most cases sufficient to be objectionable and in cases where they might be noticeable they can be almost entirely eliminated by slight variation in the adjustment of the projecting apparatus.

My invention will best be understood by reference to the following description taken in connection with the accompanying drawing in which—

Figure 1 illustrates diagrammatically the application of a lamp, constructed in accordance with my invention to moving picture apparatus; Fig. 2 is a view of the lamp filament; Fig. 3 shows the relation of the direct image of the filament and the reflected image when the projection apparatus is properly adjusted; and Fig. 4 is a view of a lamp constructed in accordance with my invention.

As shown in the drawing the lamp comprises the usual bulb 1 having a screw base 2 to which the leading-in wires 3, 4 are connected. The filament 5 which is connected to the leading-in wires is preferably of tungsten and consists of four closely coiled

sections 6, 7, 8 and 9, all arranged in the same plane and parallel to each other. The straight connecting portions 10 are made of such length that the distance between adjacent sections is substantially equal to the outside diameter of the coils. A support 11 secured to the leading-in wire 3 but insulated therefrom by a globule 12 of glass may be employed for supporting the filament at its middle. If desired other supports may be provided at other points in the filament in order that the sections may be securely held in the desired plane during the operation of the lamp. The bulb 1 is preferably filled with an inert gas such as nitrogen or argon.

In employing a lamp such as I have described in connection with moving picture apparatus the lamp is so adjusted that the center of curvature 13 of the spherical reflector 14 is in the same plane as the filament and at one side of one of the central sections near its middle point. When thus arranged section 6 is reflected so that its reflected image occupies the position 6¹ between sections 8 and 9, section 7 is reflected so that its image occupies the position 7¹ between sections 7 and 8, etc. Thus it will be seen that the filament and the reflected image of the filament combine to give the effect of a practically continuous light source in the plane of the filament. The point 13 is also on the optical axis of the condensing lens 15 which concentrates the light and directs it through the aperture 16, in front of which the film 17 is caused to pass. The light then passes through the projecting lens 18 and the pictures on the film are projected upon the screen 19.

While I have illustrated the preferred form of lamp and one application of the lamp described it will be apparent that many modifications may be made in the structure of the lamp and its application without departing from the scope of the appended claims; for example, it will be apparent that a similar effect might be secured with a straight filament having a plurality of parallel sections spaced apart a distance equal to the diameter of the filament or with a ribbon like filament having sections spaced apart a distance equal to the width of the ribbon.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. The combination in projection apparatus of an incandescent lamp having a coiled filament made up of a plurality of parallel sections all in the same plane and spaced from each other a distance approximately equal to the diameter of the coils and a spherical reflector having its center of curvature in the same plane as the lamp filament and adjacent one of the sections of the filament whereby images of the filament

sections will be reflected in such a way as to occupy and fill the spaces between the filament sections.

2. The combination in projection apparatus of an incandescent lamp having a filament made up of a plurality of parallel sections all in the same plane, the area in that plane between adjacent sections being substantially equal to the effective light emitting area of a single section in a direction normal to the plane of the filament, and a spherical reflector having its center of curvature in the same plane as the lamp filament and adjacent one of the sections of the filament whereby images of the filament sections will be reflected in such a way that they will occupy and fill the spaces between the filament sections.

3. The combination in projection apparatus of an incandescent lamp comprising a bulb having a filling of inert gas, a coiled tungsten filament therein made up of a plurality of parallel sections all in the same plane, the area in that plane between adjacent sections being substantially equal to the effective light emitting area of a single section in a direction normal to the plane of the filament and a spherical reflector having its center of curvature in the same plane as the lamp filament whereby images of the filament sections will be reflected to and fill the spaces between the filament sections.

4. The combination in projection apparatus of an incandescent lamp having a coiled filament made up of a plurality of parallel sections all in the same plane and spaced from each other a distance approximately equal to the diameter of the coils, and a reflector so related thereto that images of the filament sections are reflected in such a way as to fill the spaces between the filament sections.

5. The combination in projection apparatus of an incandescent lamp having a filament made up of a plurality of parallel sections all in the same plane, the area in that plane between adjacent sections being substantially equal to the effective light emitting area of a single section in a direction normal to the plane of the filament and a reflector so related thereto that images of the filament sections are reflected in such a way as to fill the spaces between the filament sections.

6. The combination of an incandescent lamp having a filament made up of a plurality of separated parallel sections all in the same plane, a screen and projection apparatus so related to the lamp and the screen that the direct image of the filament is projected on the screen, and reflected images of the filament sections are projected on the screen so as to fill the spaces on the screen between the spaces occupied by the direct image and thereby give a sub-

stantially uniform illumination of the screen.

7. The combination of an incandescent lamp having a coiled filament made up of a plurality of parallel sections all in the same plane, the area in that plane between adjacent sections being substantially equal to the effective light emitting area of a single section in a direction normal to the plane of the filament, a screen and projec-

tion apparatus so related to the lamp and the screen that the direct image of the filament is projected on the screen and reflected images of the filament sections are projected on the screen so as to fill spaces between the spaces occupied by the direct image. 15

In witness whereof, I have hereunto set my hand this 21 day of June, 1915.

JOHN B. TAYLOR.