

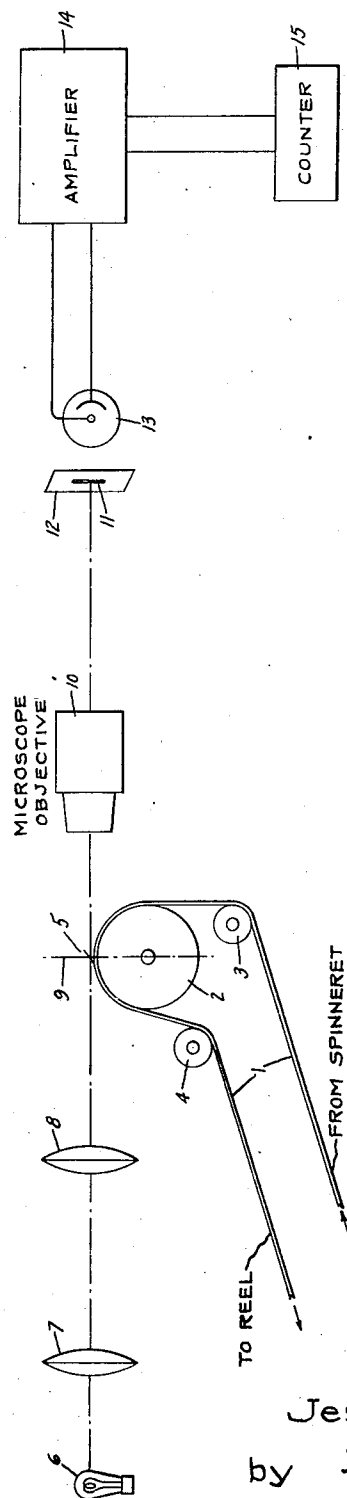
Jan. 23, 1945.

J. L. MICHAELSON

2,367,958

BROKEN FILAMENT COUNTER

Filed Nov. 23, 1942



Inventor:
Jesse L. Michaelson,

by Harry E. Dunham
His Attorney.

UNITED STATES PATENT OFFICE

2,367,958

BROKEN FILAMENT COUNTER

Jesse L. Michaelson, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York

Application November 23, 1942, Serial No. 486,589

4 Claims. (Cl. 73—160)

My invention relates to apparatus for detecting broken filaments of a thread and particularly for counting such filaments. It is the object of my invention to provide improved apparatus by which broken filaments of a thread may be detected or detected and counted while the thread is in rapid motion.

My invention will be better understood from the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

In the single figure of the drawing the thread 1 to be examined is movably supported on the small idler 2, being shown guided in its movement toward and from the idler by the idler rolls 3 and 4. The thread being examined is made up of many individual filaments which may be synthetically made and which in size may be of the order of one one-thousandth of an inch in diameter. Broken filaments of a thread are usually apparent because they stand out more or less from the body of the thread as shown for example at 5 in the drawing. For detecting such projecting broken filaments I pass a light beam close to the roll supporting the thread so as to be intercepted by them. As a light source I have shown the electric lamp 6, being preferably one having a concentrated filament. An optical system cooperating with said source comprises the condenser lens 7 which forms an image of the lamp filament on the condenser lens 8 and that lens in turn forms an image of the lens 7 in a plane represented by the dot-and-dash line 9 through which pass the broken filaments to be detected. The microscope objective 10 is arranged to produce magnified images on the slit 11 of the slit plate 12 of any such thread filaments which pass said plane. Arranged behind the slit to receive light passing therethrough is the photoelectric device 13 whose output impulses, amplified by the amplifier 14, actuates the counter 15. Thus each time a broken filament intercepts the light beam the light input to the photoelectric device is momentarily reduced causing the counter to make a registration, hence one may thereby obtain an approximation of the number of broken filaments per unit length of thread.

Although broken filaments naturally stand out to a certain extent from the body of the thread one may take advantage of centrifugal force to increase this effect by moving the thread on the idler at high speed or by making the radius of curvature of the face of the idler very small or

by doing both. Moreover, other obvious means may be employed to assist in raising the ends of broken filaments such as by directing an air stream against the thread or by the use of an electrostatic field.

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

1. Apparatus for detecting broken filaments of a thread comprising means for continuously moving the thread longitudinally, means for illuminating an area displaced from said thread through which area projecting broken filaments of the thread pass in the movement thereof, means for producing magnified images of said filaments, a photoelectric device arranged to be controlled by said images and an electro-responsive device controlled by said device.

2. Apparatus for detecting broken filaments of a thread comprising means for drawing the thread longitudinally, means for causing broken filaments thereof to stand out from the body of the thread, means projecting a light beam adjacent to but spaced from the thread for producing magnified images of said filaments, a photoelectric device arranged to be controlled by said images, and an electro-responsive device controlled by said device.

3. Apparatus for detecting broken filaments of a thread comprising means for supporting and moving the thread longitudinally, means for applying a force laterally of said thread to cause said broken filaments to be deflected from the body of the thread, means for producing an illuminated area displaced from the thread through which said broken filaments pass, means for producing a magnified image of each broken filament as it passes said area, a photoelectric device responsive to said images, and a counter connected to be controlled by the output of said device.

4. Apparatus for detecting broken filaments of a thread comprising a supporting surface for said thread having a small radius of curvature, means for rapidly moving said thread on said surface whereby the ends of said broken filaments are deflected from the body of the thread, means for producing an illuminated area through which said deflected broken filaments pass, means for producing a magnified image of each broken filament as it passes said area, a photoelectric device responsive to said images, and a counter connected to be controlled by the output of said device.

JESSE L. MICHAELSON.