To all whom it may concern:

Be it known that I, Alfred W. Wylie, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Curtain-Tightening Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the production of means for stretching and tightening a fabric curtain or the like, which it is desired to maintain taut and free of wrinkles, and is particularly designed to afford a simple, efficient and easily manipulated device for this purpose.

While not limited to such application, my invention is particularly adapted for use in connection with the fabric screens or curtains which are employed for exhibiting projected pictures, it being essential to the perfect display of such pictures that the screen or curtain shall present a smooth surface since even slight wrinkles or the appearance of looseness seriously impairs the detail of the picture and causes obscuring shadows.

The principal feature of my invention, generally stated, consists in the combination with a rigid frame or support to which the fabric or screen is attached, of a supplemental frame that is mounted upon and is adjustable with respect to the frame to which the curtain is secured, the adjustable frame being arranged to bear upon the under surface of the fabric and to force the same away from the frame to which it is attached to thus stretch or tighten the curtain and eliminate any wrinkles from its surface.

There are other features of invention, residing in particular combinations and features of elemental construction, all as will hereinafter more fully appear.

In the drawings chosen for the purpose of illustrating my invention, the scope thereof is pointed out in the claims, Figure 1 is a plan view of a form of my invention suitable for mounting large screens or curtains such as are used for exhibiting motion pictures; Figure 2 is a detail cross-section of the apparatus shown in Figure 1, the section being taken between one of the adjusting devices and the use of a housing or molding for the purpose of simulating a picture frame being also shown; Figure 3 is a detail view of a portion of the adjustable frame and one of the adjusting rods; Figure 4 is a detail view, partly in plan and partly in section, showing the preferred construction of the adjustable frame; Figure 5 is a detail plan view of one of the members of the frame adjusting device illustrated in Figure 2; Figures 6, 7 and 8 are views corresponding to Figure 2, but illustrating different modified forms of the invention; Figures 9 and 10 are detail views showing in cross section and in elevation, respectively, a modified form of means for connecting the adjustable frame to its adjusting means; and Figures 11 and 12 are detail views, partly in cross section and partly in elevation, showing further modified forms of connection between the adjustable frame and its adjusting means.

Like symbols refer to like parts wherever they occur.

I will now proceed to describe my invention more fully so that others skilled in the art to which it appertains may apply the same.

In the drawings, Figure 1 indicates the flexible curtain or screen, which may be permanently attached along its edges to the rigid frame 2 in any suitable manner, as, for example, by means of tacks 1. The configuration of the frame 2 may be as desired, but it is, as shown, preferably formed as a hollow rectangle the upper surface whereof is channeled, as at 2, to permit the adjustable frame 3 to be retracted in a direction normal to the plane of the frame 2 and curtain 1 until it lies wholly below the surface of the frame 2. If desired a casing 2 of sheet metal may be secured to the frame 2 for the purpose of causing the picture to be displayed as in a frame.

The adjustable frame 3, which is preferably of rectangular form with rounded corners, should, in order to give the best results, be sufficiently light and flexible to permit the tension on the screen 1 to be adjusted at the point where the wrinkle appears without in any material degree varying the tension on the fabric at other points. To this end the adjustable frame 3 may be conveniently constructed of sections of straight tubing 3 which, as shown in Figure 4, are connected at their ends by means of curved couplings 3 that are formed with dowelled ends which enter the tubing sections and are secured thereto. The rounded surface of the frame in contact with the under
side of the flexible screen minimizes the likelihood of producing wrinkles due to differences in the tension on the fabric inside and outside of the adjustable frame, while the rounded corners of the frame formed by the arc shaped couplings are particularly advantageous not only in gathering up and eliminating the wrinkles at the corners of the frame, which are the points where such defects are most apt to occur, but also in preventing injury to the fabric.

The frame is carried upon the frame through the intermediacy of a series of independent adjusting devices which are mounted at intervals upon the rigid frame by means of which the frames may be either brought together or separated in a direction normal to the planes of said frames. As shown in Figs. 2, 3 and 5, each of these adjusting devices preferably comprises a support or box member 4, an adjusting rod 5 having threaded engagement with the supporting member 4, and a spring 6 which is interposed between the supporting member 4 and the adjustable frame 3. The supporting members or boxes 4, which fit and are secured in appropriately shaped apertures communicating with the channels of the frame 2, are open at the sides so as to not interrupt the continuity of the frame receiving channels and are formed with threaded openings 4 that are adapted to receive the corresponding threaded portion 5 of the adjusting rod 5. The upper portion of each adjusting rod 5 is preferably of less diameter than the threaded portion thereof and its upper end is provided with a transversely extending pin or key 5 that serves to prevent the disassociation of the several rods 5 and adjustable frame 3 until all the pins 5 are brought into alinement with their respective slots 3 in the under side of the adjustable frame, as shown in Fig. 3. This simple arrangement permits the adjustable frame 3 to be drawn toward the rigid frame 2 by turning the threaded adjusting rods 5 in the proper direction, the adjusting rods being so manipulated as to always leave a sufficient number of them standing in proper position to maintain their pins out of alinement with the corresponding slots.

In order to automatically compensate for the expansion and contraction of the screen in response to slight changes in temperature and in atmospheric conditions, it is preferred to provide each of the frame adjusting devices with a light spring that is threaded upon the adjusting rod 5 and is interposed between a seat or washer 7 that bears upon the under side of the adjustable frame 3 and another seat or washer 8 that rests upon the shoulder formed at the upper end of the threaded portion of the rod 5.

In Fig. 6 of the drawings is shown a form of construction in which the rigid frame and adjustable frame 10 are yieldingly separated by light springs 11 that are housed in pockets which communicate with the channels formed in the frame 9 for receiving the adjustable frame 10. As will be readily understood, these springs effect a light and uniform pressure upon the screen wherever the adjustable frame 10 comes in contact with it, and in some cases this form of construction will be found to be sufficiently effective to prevent wrinkling and looseness of the screen.

In some installations it is not convenient to manipulate the adjusting devices from the back of the rigid frame. When such is the case the threaded adjusting rod may be conveniently rotated by an arrangement of bevel gears such as is shown in Fig. 7 of the drawings, the shaft of the bevel gear extending outwardly toward the edge of the rigid frame 13 and being preferably formed with a squared end 12 which is adapted to receive a crank by which the shaft may be rotated. This modified form of construction also shows adjusting devices for the adjustable frame 14 in which no springs are employed, the threaded adjusting rod 15 being designed to bear directly upon the under side of the adjustable frame.

In Fig. 8 of the drawings is shown a modified form of my invention which is especially suited for installations where, from lack of space, it is desired to be able to utilize as great an area as possible for the display of the pictures. In such a case the flexible screen may be attached along its edges to the rear face of the rigid frame and the adjustable frame may be forced outwardly or permitted to move inwardly by manipulating the threaded adjusting rod 18 to control the pressure of the spring 19 upon the frame 17, as will be readily understood. In this form of construction the sides of the adjustable frame are not connected at the corners, thus permitting independent movement of the several sides.

Figs. 9, 10, 11 and 12 illustrate several modified forms of construction which may be employed for connecting the adjustable frame to the threaded adjusting rods in a simple manner. In Figs. 9 and 10 the threaded adjusting rod 20 is connected to the adjustable frame 21 through the instrumentality of a clip 22, the adjustable frame being provided with grooves into which the flanges of the clip extend, and the upper end of the adjusting rod having a reduced portion which passes through an opening in the base of the clip and is upset to permanently secure these parts together. The grooves and 21 with which the adjustable frame members 21 are provided permit the assembly of the parts by slipping the clips 22 and attached adjusting rods on the frame member. In Fig. 11 the tubu...
lar adjustable frame member 23 is provided with diametrically arranged openings 23a and 23b; the aperture 23a being sufficiently large to permit the insertion of a tool for upsetting the reduced end portion of the adjusting rod 24 which passes through the aperture 23a in the tubular frame member. In Fig. 12 the adjustable frame member 25 is provided with countersunk holes, as 25a, which receive the reduced upper ends of the threaded adjusting rods 26, the upper end of each adjusting rod being upset, as at 26a, to maintain the connection of the frame and adjusting rods.

15 Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A rectangular frame for a moving picture screen adapted to be disassembled for shipment and comprising main bars adapted to be rigidly connected at their ends to form a rigid rectangular main frame, auxiliary bars of less length than the main bars and adapted to be connected at their ends to form an auxiliary frame of less external dimensions, the main bars being provided with longitudinal grooves in their faces adapted to receive the auxiliary bars and to protect them in shipment, the main frame being adapted to have a moving picture screen secured at its edges thereto, and adjusting means interposed between the main bars and the auxiliary bars associated therewith adapted to secure the auxiliary bars in their grooves and when the picture frame is assembled adapted to adjust the auxiliary frame relatively to the main frame for tensioning a picture screen.

2. A rectangular frame for a flexible moving picture screen comprising a main frame and an auxiliary frame carried thereby, the main frame being adapted to carry a flexible moving picture screen in flat condition with its edges secured to the edges of the main frame, a plurality of adjusting screws spaced around the main frame and mounted thereon adapted to adjust the position of the auxiliary frame relatively to the main frame for stretching a flexible screen, and springs interposed between said screws and the auxiliary frame for continuously exerting a yielding pressure on a screen.

3. A rectangular frame for a flexible moving picture screen comprising a rigid main frame and an auxiliary frame of less external dimensions, said main frame being provided in its face with a continuous groove adapted to receive the auxiliary frame, the main frame being adapted to have a flexible moving picture screen in flat condition attached at its edges to the outer edges thereof, and means interposed between the two frames for moving the auxiliary frame outward relatively to the main frame, the two frames cooperating to stretch a picture screen.

4. In a device of the character indicated, the combination of two frames, said frames being relatively movable away from each other in a direction normal to the planes thereof, means for moving said frames apart in a direction normal to their planes and for maintaining said frames separated to put a curtain in tension, and a yielding means interposed between the movable frame and the means for moving said frame to exert a yielding pressure on a curtain.

5. In a device of the character indicated, the combination of two frames, said frames being relatively movable away from each other in a direction normal to the planes thereof, one of said frames being a continuous flexible frame, means for moving said frames apart in a direction normal to their planes and for maintaining them separated, and a yielding means interposed between the continuous flexible frame and the means for moving said frame to exert a yielding pressure on a flexible curtain.

6. In a curtain tightening device the combination of a rigid substantially rectangular main frame, an auxiliary flexible substantially rectangular frame, of smaller dimensions carried thereby, the main frame adapted to have a moving picture screen attached thereto, yielding means interposed between the auxiliary and main frames to move the auxiliary frame from the main frame, and other means for adjusting the pressure of said yielding means, as and for the purpose specified.

In testimony whereof I affix my signature, in the presence of two subscribing witnesses.

ALFRED W. WYLIE.

Witnesses:  
ROLLO M. COLE,  
IRENE M. MURPHY.