Dec. 12, 1939. O. C. MARTIN 2,182,849

RIBBON MOUNT FOR LIGHT VALVES

Filed April 28, 1938 2 Sheets-Sheet 1

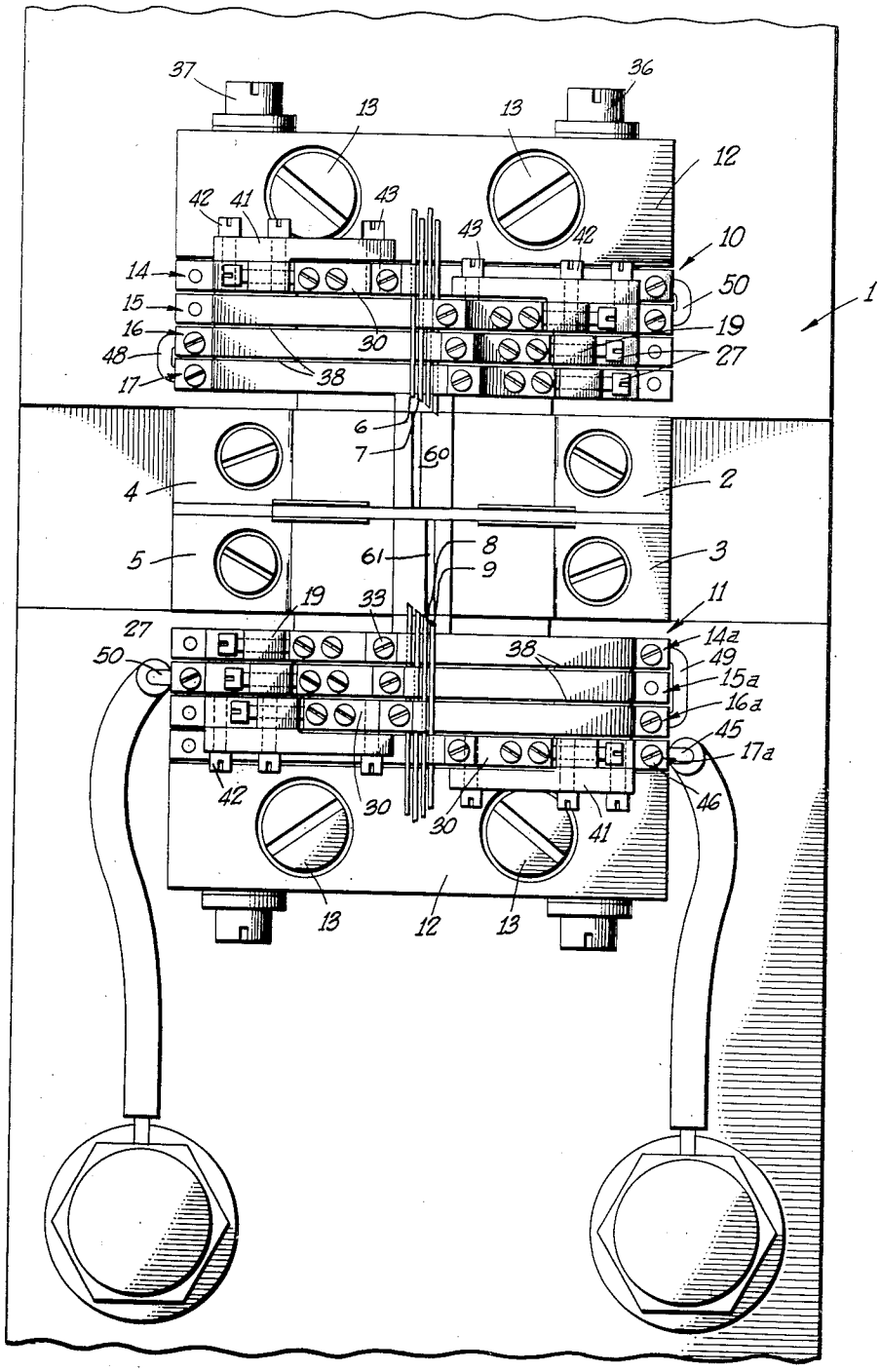


FIG. 1.

INVENTOR.
OTIS C. MARTIN
BY Harold W. Hattingly
ATTORNEY.

Dec. 12, 1939. O. C. MARTIN 2,182,849

RIBBON MOUNT FOR LIGHT VALVES

Filed April 28, 1938 2 Sheets-Sheet 2

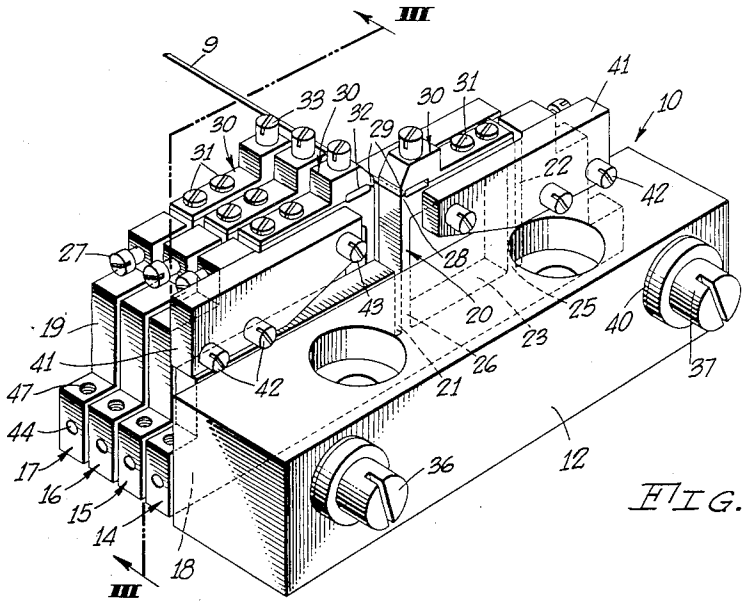


FIG. 2.

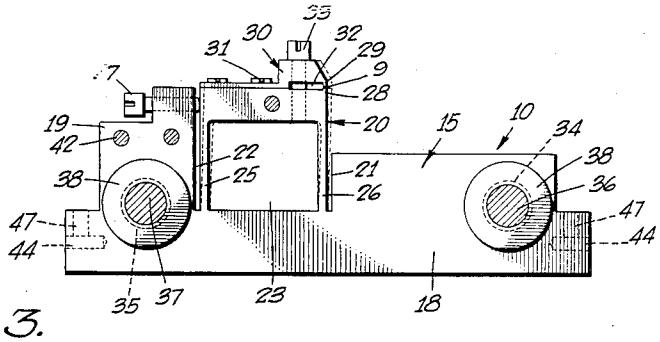


FIG. 3.

INVENTOR.
OTIS C. MARTIN
BY Harold W. Mattingly
ATTORNEY.

Patented Dec. 12, 1939

2,182,849

UNITED STATES PATENT OFFICE

2,182,849

RIBBON MOUNT FOR LIGHT VALVES

Otis C. Martin, Los Angeles, Calif., assignor to Electrical Research Products, Inc., a corporation of Delaware

Application April 28, 1938, Serial No. 204,923

9 Claims. (Cl. 88—61)

My invention relates to light valves and has particular reference to mounting devices for mounting a plurality of ribbons relative to a light aperture to constitute a light valve responsive to variations in current flow through the ribbons to open or close the gap between adjacent ribbons.

In the employment of a plurality of metal ribbons disposed in parallel relation to each other to open or close the gap between adjacent ribbons in response to variations in current flow along the ribbons, such as in the recordation of sound for sound motion pictures, it has been the common practice to attempt to stretch the ribbons in their proper spaced parallel relation across a light aperture and at the same time to so tension the ribbons that their natural period of frequency response is higher than the frequencies of current variation which will be imposed upon them during their normal service and then, while attempting to hold such ribbons so spaced and so tensioned, to clamp the ribbons in this relation. As will be readily appreciated by those skilled in the art, such method of stringing the ribbons in light valves is an extremely delicate and tedious operation, requiring utmost skill and patience to obtain the proper spacing and tensioning of the ribbons.

In my copending application Serial No. 204,702, filed April 27, 1938, I have illustrated a method and one form of apparatus for independently mounting each one of the ribbons in such manner that each ribbon may be independently adjusted relative to the light aperture and relative to the remainder of the ribbons and also may be independently tensioned to tune the ribbon to a natural frequency response higher than the normal frequencies to which it will be subjected during service.

The apparatus disclosed in that application included a plurality of clamp assemblies, one for each end of each ribbon, the assemblies being permanently secured to a base to provide a single unit which would include spaced groups of clamping mechanisms disposed at opposite ends of a light aperture, the base, the clamp assemblies and the wiring therefor being permanently assembled together as a permanent unit requiring substantial destruction of the unit when repairs or alterations were to be made in the unit other than the mere restringing of the ribbons thereon. In that application I also disclosed a clamp assembly which included a body upon which was mounted a separable clamp carriage, carrying clamping jaws.

The present invention constitutes an improvement over the ribbon mounting mechanisms disclosed in the aforementioned copending application and has for its primary object the construction of a ribbon mounting for light valves in which independent clamping assemblies are provided for each end of each of the ribbons, the assemblies at one end of the light aperture being secured together as a single unit while the assemblies at the opposite end of the light aperture are secured together as a second unit.

Another object of my invention is to provide mounting means for light valve ribbons as set forth in the preceding paragraph in which each of the units is detachable from a mounting base to permit ready disassembly of either of the units for repair or replacement.

Another object of my invention is to provide a ribbon mounting for light valves as set forth in the preceding paragraph in which each of the assemblies constitutes a unitary device detachably secured to the remaining assemblies and to a mounting block by which the entire set or unit of assemblies may be secured upon a suitable base.

Another object of my invention is to provide a clamp assembly of the character set forth in which a clamp carriage is formed integrally with a supporting body therefor and which may be readily and economically manufactured.

Other objects and features of my invention will be apparent from a study of the following specifications, read in connection in the accompanying drawings, wherein

Fig. 1 is a plan view of a light valve and ribbon mounting constructed in accordance with my invention;

Fig. 2 is a detail perspective view of one of the mounting units which may be employed at each end of the light aperture to secure one end of all of the ribbons; and

Fig. 3 is a detail elevational view of one of the clamp assemblies employed to construct the unit shown in Fig. 2.

As will be apparent from a study of the following specification, the construction and operation of my device is such that it is readily adapted to the mounting of ribbons for either 4-ribbon or 2-ribbon valves or for any other valve employing a multiplicity of ribbons but for purposes of this disclosure I have illustrated my valve and ribbon mounting as adapted for use with a 4-ribbon valve.

As illustrated in Fig. 1, the valve may comprise a suitable base plate 1 having mounted thereon a plurality of pole pieces 2, 3, 4 and 5, the pole

pieces 2—4 defining a light aperture 60 to be disposed beneath a pair of metal ribbons 6 and 7 while the pole pieces 3—5 define a light aperture 61 disposed beneath a corresponding pair of ribbons 8 and 9 so that curent supplied to the ribbons 6—7 wi l vary the effective opening for the passage of light through the light aperture 60 defined between the pole pieces 2—4 while similarly current passing through the ribbons 8—9 will vary the effective size of the light aperture 61 defined between the pole pieces 3—5.

In order to mount the ribbons 6—7—8—9 in their proper relation to their respect ve light apertures and in properly spaced parallel relation to each other, I provide a pair of ribbon mounting units 10 and 11 disposed at opposite ends of the light apertures defined between the pole pieces 2—4, 3—5, one of these units 10 including a mounting block 12 which may be constructed of a length of steel or other metal adapted to rest upon and to be secured to the base 1 as by means of screws 13. The mounting block 12 const tutes the support for a plurality of ribbon clamp assemblies 14, 15, 16 and 17, there being provided on the unit 10 one clamp assembly for each of the ribbons emp'oyed upon the valve. The clamp assemblies 14, 15, 16 and 17 are substantially identical in construction, one of these assemblies being illustrated particularly in Fig. 3 as comprising a body member 18 from which rises a vertically extending leg 19 and a clamp carriage 20, the body, leg and carriage being formed integrally from a single thin plate of steel or similar resilient material as by forming a block or blank of steel with a profile as shown in Fig. 3 including a pair of relatively narrow slots or saw cuts 21 and 22, and a substantially rectangular bore 23, the saw cuts and the bore 23 providing a pair of relatively narrow vertical legs 25 and 26 integrally connecting the clamp carriage 20 to the body 18 and to form with the body 18 and carriage 20 a parallelogram permitting the clamp carriage 20 to be shifted longitudinally relative to the body 18 by tightening or loosening of a shifting screw 27 which may be threaded through the upstanding leg 19 of the body 18 and into abutment with one end of the clamp carriage 20. As will be noted in Fig. 3, the clamp carriage 20 is normally in the position shown in full lines but may be shifted from this position toward the right-hand end of the body 18 by tightening the screw 27, such shifted position being illustrated in dotted lines. The saw cuts and bore may be formed in the original blank from which slices are taken to form the body member 18 or, if preferred, the body member and clamp carriage may be constructed from blanks of thin plate steel and formed into the shape shown in Fig. 3 by any well known machine methods.

The clamp carriage 20 is provided near one of its ends with a clamping jaw 28 adapted to cooperate with a clamping jaw 29 formed upon a clamp cap 30 which may be either constructed integrally with the clamp carriage 20 or may be constructed as a separate piece to be secured thereto as by means of screws 31 (see Fig. 2). The clamp cap is preferably formed such that its natural resilience tends to separate the jaw 29 from the jaw 28 to permit the ready insertion of the ribbon to be clamped thereby and an elongated s'ot or throat 32 is preferably formed immediate'y adjacent the jaw 29 either by forming a shallow recess in either or both the lower edge of the clamp cap 30 or the upper edge of the carriage 20. The jaws 29 and 30 may be drawn into clamping relation by means of a suitable clamp screw 33 passing through the clamp cap 30 and threaded into the carriage 20.

Each of the body members 18 is provided with a pair of bores 34 and 35 disposed near the ends of the body, through which suitable screws 36 and 37 may pass to secure the assemblies to the mounting block 12, it being understood, however, that each of the assemblies must be insulated from each other as by interposing insulating washers 38 between the mounting block 12 and the assembly 14 and similar washers between each of the adjacent assemblies 15, 16 and 17. If desired, the end assembly 17 may have its bores 34 and 35 threaded to engage the ends of the screws 36—37, in which event suitable insulating washers 39 and 40 should be interposed between the screws 36—37 and the mounting block 12, and the bores in the mounting block 12 through which these screws extend should be sufficiently large to permit the passage therethrough of the screws without making metallic contact with the mounting block.

As is illustrated particularly in Fig. 3, the washers 38 have their interior openings of smaller diameter than the bores 34 through the body 18 so that by centering the screws 36—37 in the bores, metallic contact between the screws and the bodies is effectively avoided.

With the construction thus far described, it will be apparent that any number of clamp assemblies 14, 15, 16 and 17 may be secured to and mounted on the mounting block 12 and so assembled as a unit, there being one of such assemblies for each of the ribbons desired to be used upon a particular light valve.

By referring particularly to Fig. 1, it will be noted that the assemblies 15—16—17 are so constructed that their clamp carriages are progressively offset from each other when the assemblies are secured together and to the mounting block 12 so that the clamping jaws for each of these asemblies is sufficiently offset to hold the associated ribbon in spaced relation to the other ribbons secured to the remaining assemblies. For purposes of convenience in assembly and for convenience in tensioning the ribbons, as will be more fully pointed out hereinafter, the assembly 14 adjacent the mounting block 12 is preferably turned end for end to the remainder of the assemblies so as to dispose its clamping jaws in still further offset relation to the clamping jaws of the remaining assemblies.

Employing the units 10 and 11 as hereinbefore described, these units may be mounted at opposite ends of the light apertures defined between the pole pieces 2—4 and 3—5 so that the ribbon 6 may be threaded endwise through the slot or throat 32 in the assembly 14 and (the clamping screw 33 being loosened to separate the jaws) the ribbon may be moved laterally into the space between the jaws on this assembly and the screw 33 may be tightened to securely clamp one end of the ribbon therebetween. The opposite end of the ribbon 6 may be threaded endwise through the throat of the assembly 14*a* on the unit 11 at the opposite end of the aperture and may be clamped in the same manner to the assembly 14*a*.

As will be understood by those skilled in the art, the ribbons 6, 7, 8 and 9 are initially cut to a length somewhat in excess of the length required to extend between the clamping assemblies 14 and 14*a* and employing my construction

of clamp assemblies the ribbons may be threaded endwise from either end of the base 1, any excess length of the ribbon passing through the slot or throat 32 of the clamping assemblies for the adjacent ribbons, as is illustrated in Fig. 1. The elongated slots or throats 32 provide ample opening in each of the assemblies, permitting the ready passage of the ribbons to all of the assemblies to facilitate the ready passage of the ribbons through any of the assemblies through which they are not to be clamped and permits the grasping of both ends of the ribbon while the ribbon is being clamped in its particular assemblies.

Similarly, the ribbon 7 may be threaded from either end through the clamp assembly 15 and the clamp assembly 15*a* and may have its opposite ends clamped in these assemblies by the mere tightening of the clamping screws 33 associated therewith, any excess length of the ribbon 7 passing through the throat in the assembly 16*a*. The ribbon 8 may be threaded through the throat of the assembly 15 and into engagement with the jaws of the assembly 16 while the opposite end of this ribbon will extend between and may be clamped betwen the jaws of the assembly 16*a*. The ribbon 9 may be threaded from either end through the assemblies 17 and 17*a* and through the throats of the assemblies 15 and 16.

Each of the ribbons, as it is inserted, is preferably initially clamped in one of its assemblies and then drawn taut before the opposite end of the ribbon is clamped in its associated assembly. After all of the ribbons are so secured at their opposite ends in their individual clamping assemblies, the ends of the ribbons are cut off flush with their clamp carriages and suitable adjustment of the screws 27 associated with each of the assemblies may now be made to accurately space the ribbons in the desired parallel spaced relation to its adjacent ribbon. Such adjustment may be made while observing the ribbons under a microscope to secure great accuracy, it being noted that each of the clamps for each of the ribbons is independently adjustable without releasing or altering the clamped relation of the ribbon.

The respective ribbons may now be individually tuned or tensioned to the desired natural frequency period as by providing upon at least one clamping assembly for each ribbon a tensioning device which may be constructed as indicated herein of a tension arm 41 secured to the upstanding leg 19 of the assembly body as by means of screws 42, the tension arm extending along the carriage 20 in such manner that a tension screw 43 extending through the tension arm and threaded into the carriage for the associated assembly may be tightened or loosened to shift the clamp carriage 20 longitudinally with respect to the axes of the ribbons in minute increments until the desired resonance frequency is achieved.

By employing my individual clamp assemblies for each of the ribbons, the clamp assemblies may constitute a portion of the electrical conductors supplying current to the ribbons as by providing at each end of the assembly bodies 18 a shallow bore 44, into which the end of a wire or conductor 45 may extend where it may be clamped by a terminal screw 46 threaded into a communicating bore 47. Thus each of the clamp assemblies constitutes a terminal by which interconnection between the several ribbons and the microphone or other circuits may be made. As illustrated herein, conductor 45 may supply current from the pick-up circuit to the assembly 17*a* and thence through the ribbon 9 to assembly 17, a jumper 48 constituting a short length of wire being employed to interconnect clamp assemblies 16 and 17 to supply the ribbon 8 with current flowing therethrough in a direction opposite to that which flowed through ribbon 9.

A similar jumper 49 may be employed to interconnect assemblies 14*a* and 16*a* to supply current to ribbon 6 while a jumper 50 interconnects assemblies 14 and 15 to send current through the ribbon 7 in a direction opposite to that flowing in ribbon 6, the circuit in this form of the device being completed through a conductor 50 which extends to the pick-up circuit.

It will be noted that by employing the individual clamp assemblies described herein, light valves employing any number of ribbons may be readily assembled merely by selecting for each of the units as many of the clamping assemblies as there are desired to be ribbons on the finished valve and such units for 2-ribbon, 4-ribbon or any other multiple ribbon valves may be assembled and kept in stock from which valves employing different numbers of ribbons may be readily assembled.

It will also be noted that I have provided a ready means for repairing or replacing any parts which may become defective during use, it being merely necessary to disconnect the unit containing the defective part from the base, replace a defective assembly with a new assembly, and the device is ready for reassembly and restringing.

While I have shown and described the preferred embodiment of my invention, I do not desire to be limited to any of the details of construction shown or described herein, except as defined in the appended claims.

I claim:

1. In a device for mounting metal ribbons on light valves, a base having means thereon defining a light aperture, a ribbon mounting unit on each side of said aperture, each unit comprising a mounting block and a plurality of ribbon clamp assemblies, one clamp assembly for each of said ribbons, means common to all said clamp assemblies for mounting said clamp assemblies upon said mounting block, means for insulating said assemblies from said block and from each other, and means for detachably securing said mounting block to said base.

2. In a device for mounting metal ribbons on light valves, a base having means thereon defining a light aperture, a ribbon mounting unit on each side of said aperture, each unit comprising a mounting block and a plurality of ribbon clamp assemblies, one clamp assembly for each of said ribbons, means extending through all said assemblies securing said clamp assemblies upon said mounting block, means for insulating said assemblies from said block and from each other, means for detachably securing said mounting block to said base, each of said clamping assemblies including a body member and a clamp carriage formed thereon for engaging and clamping a ribbon, and means for shifting the ribbon engaging end of said clamp carriage relative to said body to adjust the position and tension of said ribbons relative to the aperture.

3. In a device for mounting metal ribbons on light valves, comprising a base having means de-

fining a light aperture, a mounting unit for each end of said ribbons, each of said units comprising a mounting block and a plurality of clamp assemblies secured thereto as a unit by means extending through all said assemblies, each of said clamp assemblies including a body member adapted to extend laterally with respect to the light aperture of the valve and having integrally formed therewith clamping jaws for engaging and clamping one end of a ribbon, the clamping jaws of each assembly on the unit being offset laterally relative to the jaws of the remaining assemblies, and means for detachably securing the mounting block to the base.

4. In a device for mounting metal ribbons on light valves, comprising a base having means defining a light aperture having a mounting unit for each end of said ribbons, each of said units comprising an elongated mounting block and a plurality of clamp assemblies secured one upon the other upon one long face of said block, each of said assemblies comprising a relatively thin plate of resilient material having a clamp carriage integrally formed thereon, clamping jaws associated with the free end of said carriage for engaging and clamping a ribbon, adjusting means on said plate for engaging and shifting the free end of said carriage longitudinally of said plate, tension means secured to said plate and engaging said carriage for shifting the free end of said carriage laterally relative to said plate, means extending through all of said assemblies for securing said assemblies upon said block to form a unit therewith, and means for detachably securing said mounting block to said base.

5. In a clamp assembly for engaging and clamping one end of a light valve ribbon, a relatively thin plate of resilient material having a clamp carriage formed integrally thereon comprising a parallelogram, the lower leg of which is constituted by said plate and the upper leg of which is spaced from the body of said plate by relatively thin strips of said plate material, screw means extending through said plate and engageable with said upper leg of said parallelogram for shifting said leg longitudinally relative to said plate, and clamp means carried by said leg for engaging and clamping a ribbon to said leg.

6. In a clamp assembly for engaging and clamping one end of a light valve ribbon, a relatively thin plate of resilient material having a clamp carriage formed integrally thereon comprising a parallelogram, the lower leg of which is constituted by said plate and the upper leg of which is spaced from the body of said plate by relatively thin strips of said plate material, screw means extending through said plate and engageable with said upper leg of said parallelogram for shifting said leg longitudinally relative to said plate, clamp means carried by said leg for engaging and clamping a ribbon to said leg, tension means including an arm secured to said plate and extending along said leg, and means coupling said leg and said tension arm for shifting said leg laterally relative to said plate.

7. In a clamp assembly for engaging and clamping one end of a light valve ribbon, a relatively thin plate of resilient material having a clamp carriage formed integrally thereon comprising a parallelogram, the lower leg of which is constituted by said plate and the upper leg of which is spaced from the body of said plate by relatively thin strips of said plate material, screw means extending through said plate and engageable with said upper leg of said parallelogram for shifting said leg longitudinally relative to said plate, clamp means carried by said leg for engaging and clamping a ribbon to said leg, terminal bores extending into each of said plates for receiving an electrical conductor therein, and means on said plate for clamping said conductor in said bore.

8. In a clamp assembly for engaging and clamping one end of a light valve ribbon, a relatively thin plate of resilient material having a pair of bores extending transversely therethrough near opposite ends of said plate and having a clamp carriage formed integrally thereon comprising a parallelogram, the lower leg of which is constituted by said plate and the upper leg of which is spaced from the body of said plate by relatively thin strips of said plate material, screw means extending through said plate and engageable with said upper leg of said parallelogram for shifting said leg longitudinally relative to said plate, and clamp means carried by said leg for engaging and clamping a ribbon to said leg.

9. In a clamp assembly for engaging and clamping one end of a light valve ribbon, a relatively thin plate of resilient material having a pair of bores extending transversely therethrough near opposite ends of said plates and having a clamp carriage formed integrally thereon comprising a parallelogram, the lower leg of which is constituted by said plate and the upper leg of which is spaced from the body of said plate by relatively thin strips of said plate material, screw means extending through said plate and engageable with said upper leg of said parallelogram for shifting said leg longitudinally relative to said plate, clamp means carried by said leg for engaging and clamping a ribbon to said leg, and means for mounting a plurality of said assemblies together as a unit including a mounting block and means extending through all of the bores of said plates for securing said plates to said mounting blocks.

OTIS C. MARTIN.