No. 883,793. PATENTED APR. 7, 1908.

E. O. ENGBERG.

MACHINE FOR MAKING WINDOW SHADES.

APPLICATION FILED OCT. 5, 1905.

4 SHEETS—SHEET 1.

Fig. 1

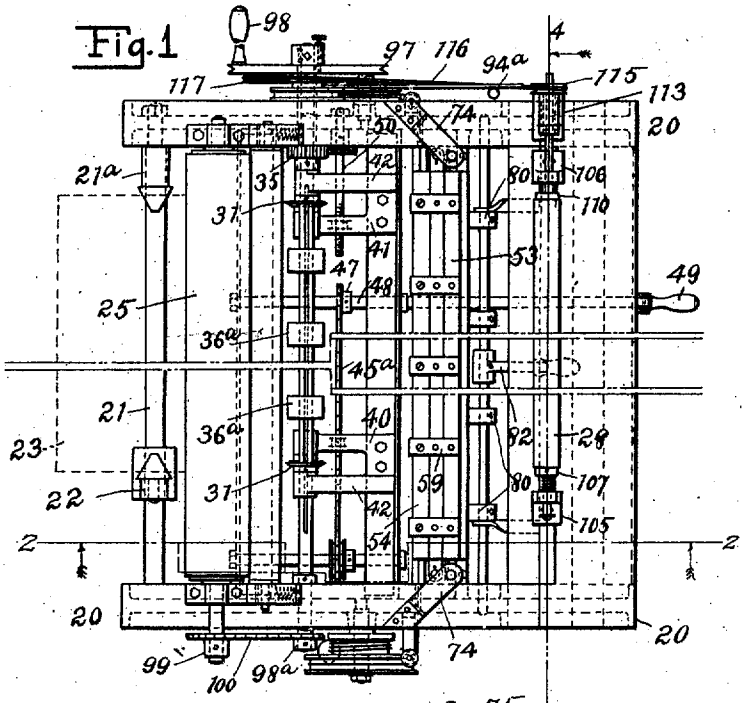
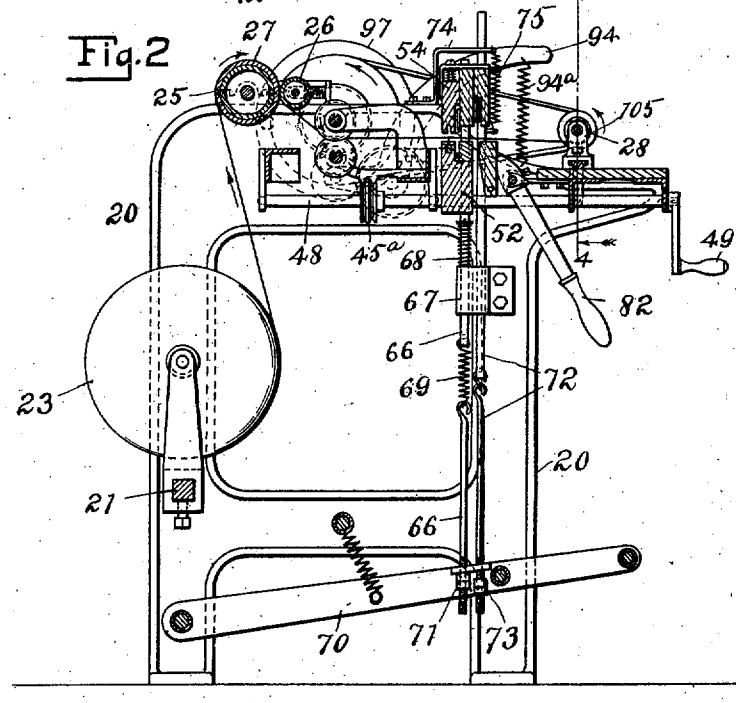


Fig. 2



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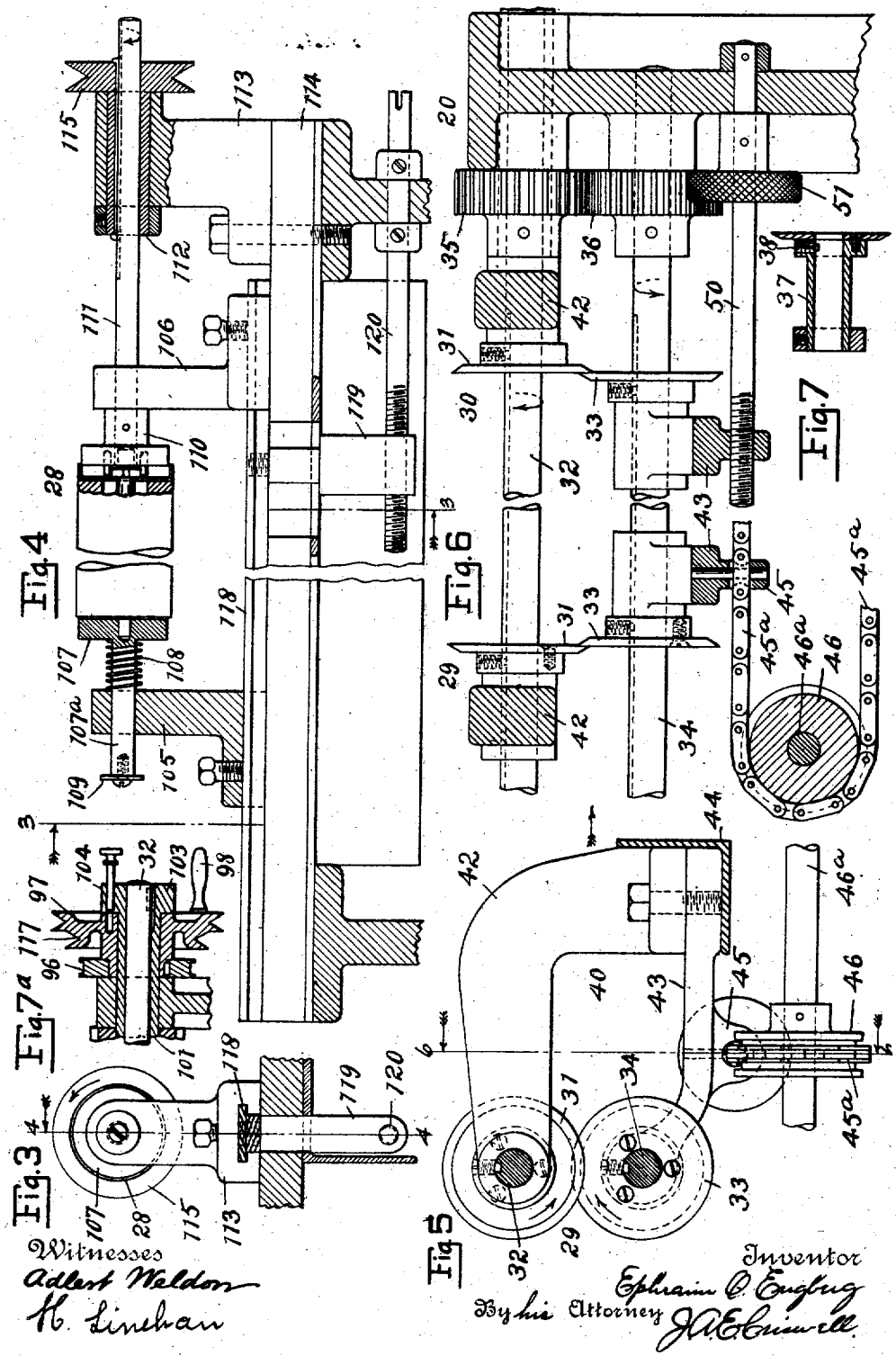
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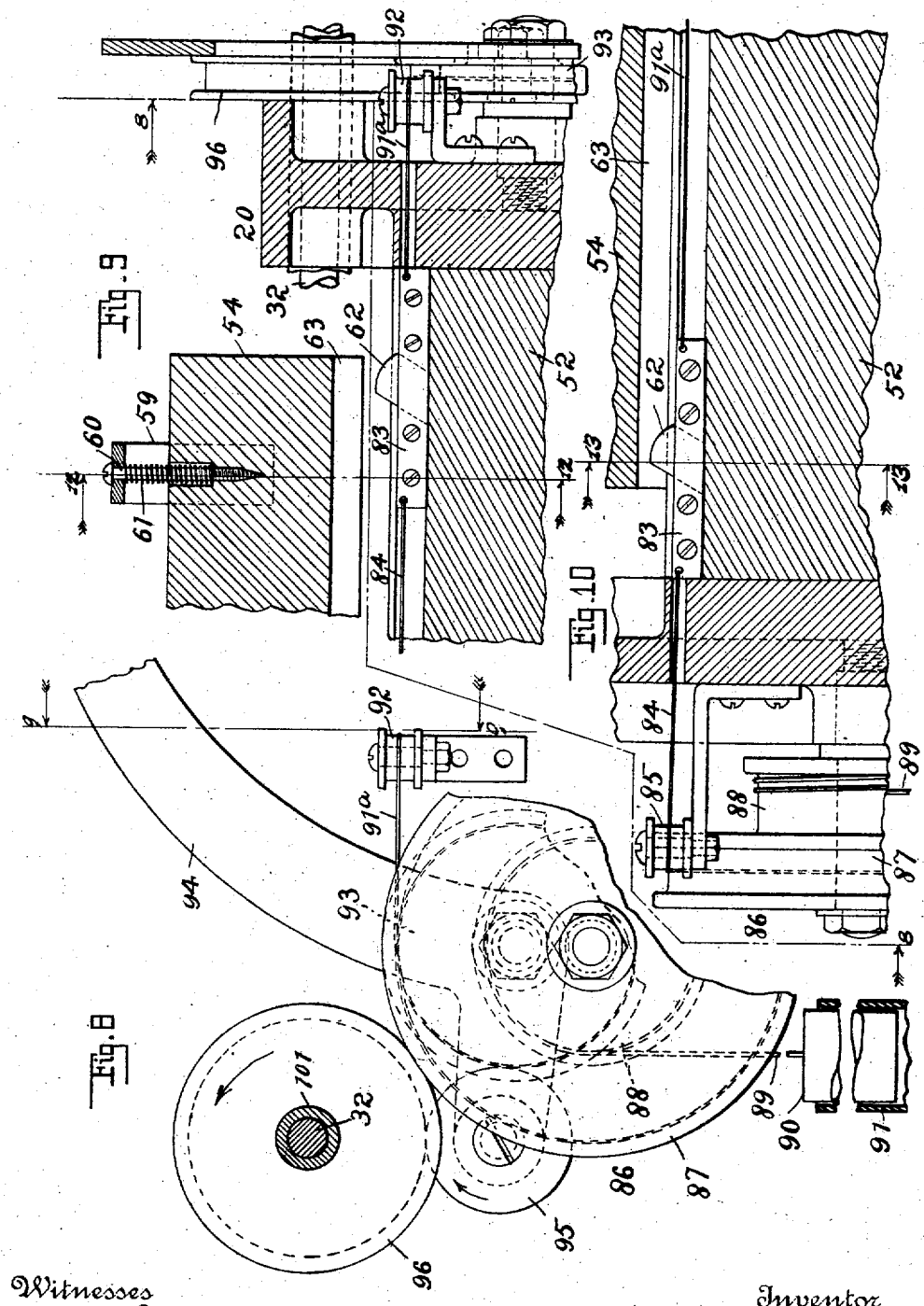
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4 SHEETS—SHEET 3.



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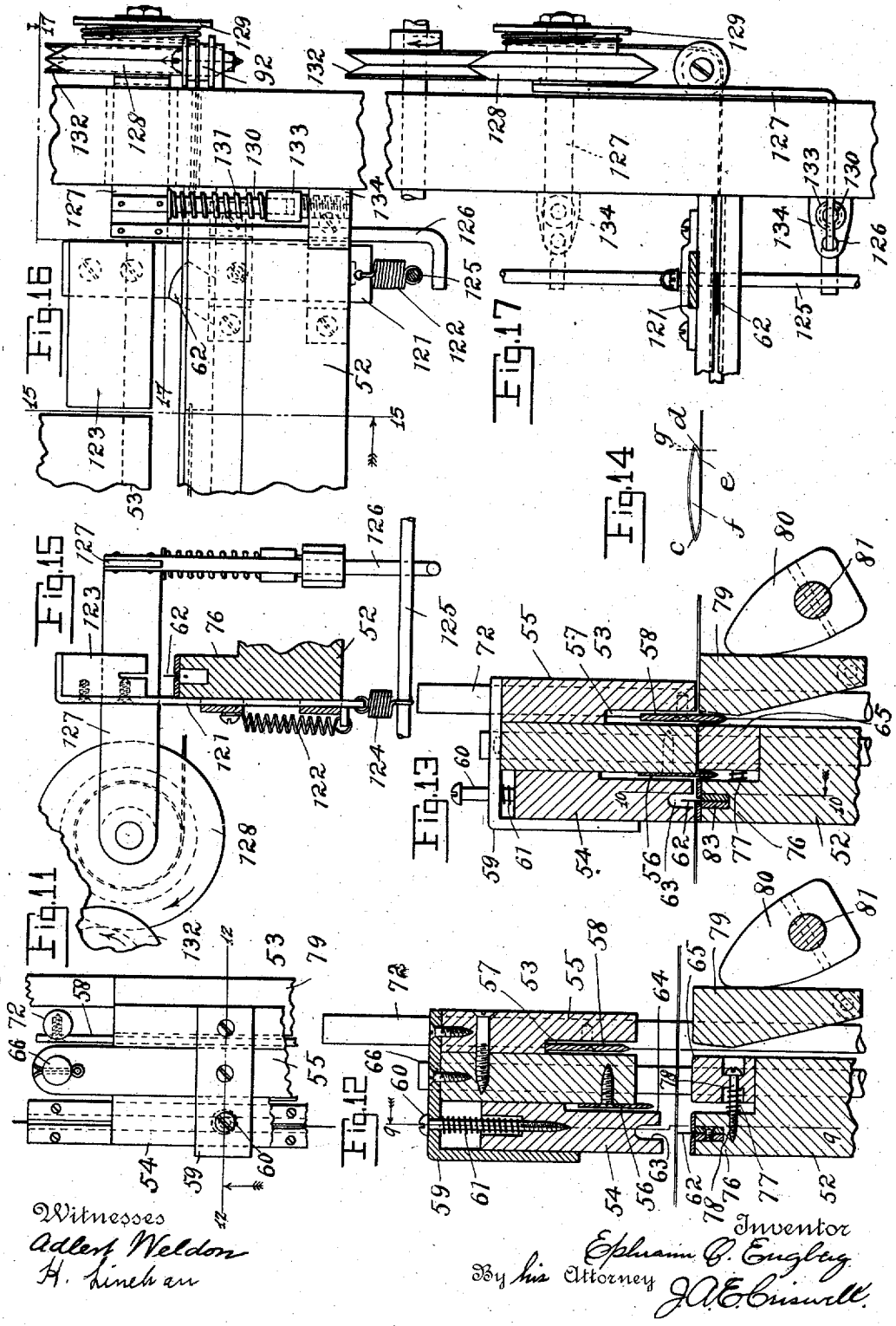
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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING WINDOW-SHADES.

No. 883,793. Specification of Letters Patent. Patented April 7, 1908.

Application filed October 5, 1905. Serial No. 281,474.

To all whom it may concern:

Be it known that I, EPHRAIM O. ENGBERG, a citizen of the United States, and a resident of Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Machines for Making Window-Shades, of which the following is a full, clear, and exact description.

This invention relates more particularly to machines such as disclosed in my Patent No. 754,759, dated March 15, 1904.

The primary object of the invention is to provide simple and efficient means whereby the material or goods employed in the manufacture of window shades may be quickly and accurately cut from a web or roll, one end automatically wound upon a shade roller, and the other end folded to form a loop or hem for the usual shade slat.

A further object of the invention is to provide simple and efficient means for automatically cutting the material transversely, and to provide means for properly holding and accurately folding and creasing the material.

With these and other objects in view, the invention will be hereinafter more particularly described with reference to the accompanying drawings, forming a part of this specification, and will then be pointed out in the claims at the end of the description.

In the drawings, Figure 1 is a plan view of one form of machine embodying the invention. Fig. 2 is a vertical section taken on the line 2—2 Fig. 1. Fig. 3 is a vertical section taken on the line 3—3 of Fig. 4 of the shade-roller operating mechanism. Fig. 4 is a transverse vertical section, partly broken away and partly in elevation, taken on the line 4—4 of Figs. 1, 2 and 3. Fig. 5 is a side elevation, partly in section, of the knives for cutting or trimming the material lengthwise. Fig. 6 is a transverse section partly in elevation, taken on the line 6—6 of Fig. 5. Fig. 7 is a detail section showing one means for holding the rotary knives on the shafts. Fig. 7ª is a detail section, showing how the transverse cutting knife may be operated without rotating the drive shaft. Fig. 8 is a side elevation, partly in section, taken on the line 8—8 of Figs. 9 and 10 of the mechanism for operating the transverse cutting knife. Fig. 9 is a vertical section taken on the line 9—9 of Figs. 8 and 12, showing the means for automatically moving the knife across the machine preparatory to cutting the material. Fig. 10 is a fragmentary view, partly in section and partly in elevation, of the means for quickly forcing the knife at the proper time across the machine to cut the material. Fig. 11 is a fragmentary detail plan of the folding head. Fig. 12 is a vertical section taken on the line 12—12 of Figs. 9 and 11, showing the loop-forming means in its normal position. Fig. 13 is a vertical section taken on the line 13—13 of Fig. 10, showing the loop-forming mechanism in folding position. Fig. 14 is a detail view of the shade-slat loop after being formed. Fig. 15 is a vertical section, partly in elevation, showing an additional or supplemental clamping means for the edge of the material, and slightly different knife-operating means, the section being taken on the line 15—15 of Fig. 16. Fig. 16 is a fragmentary elevation, and Fig. 17 is a fragmentary plan, partly in section, taken on the line 17—17 of Fig. 16 of the means shown in Fig. 15.

Where a large variety of sizes of window-shades both in lengths and widths are to be made as is the case with many manufacturers of this class of goods, it is desirable that the parts be readily adjustable, and not necessarily entirely automatic, and the machine herein shown and described is particularly adapted for the jobbing trade so as to permit nearly all the various sizes and lengths of shades to be quickly and properly made. It is to be understood, however, that any or all of the parts may be operated by power instead of manually as desired, or the machine may be made to make only one or several sizes of shades.

The frame 20 may be of any suitable form, and between the ends of the frame is a rectangular bar 21 in which are held the centers 21ª and 22, one or both of which are adjustably held on said bar. A roll 23 of fabric, goods or shade material is supported between the centers 21ª and 22 and is led over a roll 25 and between said roll and a tension roll or device 26. The roll 25 may be wood or metal and may be covered with a layer of rubber or other yielding surface 27, while the roll 26 is loosely held in boxes and is normally forced toward the roll 25 by means of springs as shown. The material is gripped between the rolls 25 and 26 sufficiently to be drawn from the roll 23. The inner end of the material is fastened in the usual manner to the shade-roller 28 either by tacks or special clamping means, and as the roll 25

and the shade-roller 27 are positively operated as hereinafter described, the material will be forced inward and will be wound on the shade-roller.

The material may be trimmed or cut along either or both edges. As shown in Figs. 5 and 6, there are two sets of cutters or knives 29 and 30, one for each side. The cutters 31 of each set are held on the main drive shaft 32, and the cutters 33 are likewise held on the shaft 34, and rotate in unison through the gears 35 and 36, the material being supported between the cutters by the rolls 36[a] carried by the two cutter shafts. The cutters are beveled on one side and the cutters 31 of each set are arranged above the cutters 33. Each cutter is fastened to a boss on a rotatable sleeve 37, Fig. 7, and in each boss is a set screw 38, the end of which fits into splines or keyways extending lengthwise of the shafts 32 and 34, or said sleeves may be otherwise secured to or held in bosses of the brackets 40 and 41 which support and carry the cutters. The brackets of each set of cutters comprises two members which are fastened together, and the member 42 carrying the upper cutters extends to the plane of the drive shaft 32, and the member 43 carrying the lower cutters extends to the plane of the shaft 34. Both of the sets of cutters are adjustable along the shafts 32 and 34, and where they are fastened together they slide along an angle bar 44 or other guide. The lower member 43 of bracket 40 has a boss 45 to which is fastened an endless chain 45[a] by which a quick adjustment of the set of cutters 29 is obtained. This chain, Figs. 1, 2, 5 and 6, passes around a wheel 46 secured to a rotatable shaft 46[a], and said chain passes around a sprocket 47 secured to a shaft 48. This shaft 48 is arranged to rotate on the frame, and on one end is a handle 49 by which the chain 45[a] is operated and the cutters adjusted to cut the material the desired width. The cutters 30 have a much less adjustment through the screw 50 and is not adjusted except to trim one edge of the material properly. The screw 50 is held to rotate at one end in the frame, and the other end is threaded to engage a lug on the lower member of the bracket 41 as shown in Fig. 1. A thumb-nut 51 is held on the screw 50 and when rotated shifts the cutters of the set 30 along their shafts. After the cutters 30 are once adjusted the set 29 may be quickly positioned for cutting different width of shades.

For the purpose of forming the shade-slat loop or hem, or for cutting the material transversely, I may employ various means. As shown the shade material passes over a transverse bar or support 52 rigidly held between the ends of the frame until sufficient has been wound on the shade-roller to give the proper length of shade. Above the bar 52 and the material is a vertically movable cross-head 53. This head is suitably guided in the frame, and comprises two members 54 and 55. The member 55 has a folding blade 56 fixed thereto, and has a groove or channel 57 in which is a relatively movable second folding blade 58, which is normally held within the groove lengthwise of the cross-head, The member 55 has L-shaped brackets or guides 59 secured thereto, between which and said member is the relatively movable and yielding clamping member 54. At intervals of its length the member or bar 54 is provided with screws or bolts 60 which project from the member or bar 54 and pass through apertures in the brackets 59, the heads of the bolts serving to position the member 54 with respect to the member 55. A spring 61 is arranged around each bolt and has one end fitting in a socket in the member 54 and its other end abutting against the under side of the brackets 59. As the head 53 is forced downward the member 54 will clamp the material between said member and the bar 52. At this time the transverse cutting knife 62, to be presently described, is operated to cut the material, and on further movement of the head the blade 56 will complete the first fold in the material, the under side of the member 54 being grooved at 63 lengthwise thereof for the passage of the knife, and one side of the clamping member, as 64, being shorter than the other so that the material may be clamped on one side only of the knife, while the short part permits the end of the material to be readily withdrawn from under the member 54 as the blade 56 moves further downward. The head 53 in this position, will have its downward movement arrested by a device, bar, or member 65, and the material will be rigidly clamped between said device and the member 55 of the head. The head 53 is held at each end to a two-part rod 66, Fig. 2, the upper member of which is guided in a bracket 67, and above the lug is a spring 68 which engages a part of the rod 65 and normally forces the head upward. A spring 69 connects the two parts of each rod 65 together, and the lower end of each rod is held to a treadle 70, the nuts 71 on the lower end thereof serving to properly adjust the parts. This treadle 70 is pivoted at one end to the frame, and has projections through which the screw-threaded end of the two-part rods 72 loosely pass, on the ends of which rods are nuts 73. The rods 72, one at each end of the machine have one part passing through the guides or brackets 67 and their upper ends rigidly secured to the second folding blade 58. The rods have their upper ends guided in the brackets 74, and secured to the brackets and the rods are springs 75 which normally keep the blade 58 within the

channel in the cross-head 53. As the treadle 70 is operated and the head 53 is arrested by the device 65, the springs 69 will yield, and on further movement of the treadle the latter will engage the nuts 73 and will force the second blade 58 downward independent of the head and will form the second fold as shown in Fig. 13, the surplus material needed being unwound from that on the roll. By adjusting the nuts 73 in their rods the length of the loop may be varied at will for different sizes of slats. The mechanism for operating the blades and cross-head is substantially the same as in my patent previously referred to.

The blade 56 and the blade 58 during the folding of the loop pass on opposite sides of the device 65. The bar 52 is cut away at its upper side in which is slidingly held the device 65. This device is movable toward the part 76 of the bar 52, and is normally held away from the part 76 by the springs 77, to provide a groove for the blade to enter. These springs surround bolts or screws 78 which serve to guide and hold the device on said bar. A swinging or pivoted member or cam-bar 79 is located adjacent to the bar 52, and as soon as the treadle 70 is released the cam-bar is swung inward so as to clamp the folds between the said cam-bar, the device 65, and fixed bar 52 to crease and finish the folding of the loop. The cam-bar 79 is arranged in the path of cams 80. These cams are held on a rock-shaft 81, to which is secured a lever 82, by which the shaft and cams are operated at the proper time to finish the creasing or folding of the material. The shade material is thus folded and creased at two distinct points, indicated by *c* and *d*, Fig. 14, the part *e* of the first bend where the knife cuts the material transversely, forms the inturned end and lies next to the body of the material within the loop or socket *f*. As soon as the creasing means is released owing to the nature of the folds and the stiffness of the material, the loop will be formed substantially as shown in Fig. 14, after which the material is stitched as at *g*, to finish the loop or hem for the usual shade-slat.

The transversely cutting device or knife 62 in the case is operated automatically. The knife or cutter is inclined and is fastened securely between two plates forming a knife-bar 83. This bar is held to slide in a groove or slot in the upper surface of the fixed bar 52 adjacent to the device 65, and immediately under the groove in the clamping member 54 of the cross-head. A wire 84, or other flexible connection, is fastened to one end of the knife-bar 83 and passes through the frame of the machine, around a guide roll 85 mounted on the frame, and then around a drum 86, which is held to rotate on a stud projecting from the machine frame. The drum 86 has two parts 87 and 88, the larger part 87 serving to wind the wire 84 thereon. The smaller part 88 has a flexible connection or a wire 89 adapted to be wound thereon, one end of which is fastened to the part 88 and the other end to a weight 90, the latter being guided in a tubular device 91. The weight 90 serves to force the knife in the direction to cut the material, and to yieldingly hold it at one side of the machine, and the drum having two parts of different diameters will impart a greater movement to the knife for the same relative movement of the weight. At the other end of the knife-bar is secured a flexible connection or a wire 91[a] that passes through an opening in the frame and around a guide roll 92, then around a drum 93, which is rotatably held on a stud projecting from the frame. To the stud is pivotally held a lever 94, on one end of which is a friction pulley or wheel 95 which normally engages a pulley 96 held to rotate with the drive shaft 32. A power wheel 97 is normally held to the drive shaft 32 which may be operated manually by a handle 98, or said wheel may be grooved or arranged to be driven by an electric or other motor. The outer end of the lever 94 is forced downward by a spring 94[a], to cause the pulley 95 to frictionally engage the surface of the pulley 96 and drum 93, and as the drive shaft 32 is rotated, the drum will wind the wire 91[a] and will move the knife across the machine under the material, the pulleys slipping when the knife-bar is entirely across the machine, or against a stop. As soon as the lever 94 is operated to release the friction pulley, the weight 90 will force the knife quickly across the machine to cut the material while clamped between the member 54 and bar 52 of the loop or socket forming means.

Any suitable timing and operating means may be employed and where a standard size of shade is made, or in any other case, when desired, all or part of the several mechanisms may be operated by power from a common shaft. The lower cutter shaft 34 is provided at one end with a sprocket 98[a], Fig. 1, and on one side of the shaft of roll 25 is a sprocket 99, around both of which sprockets pass a chain 100 for positively driving the feed roll 25, the wheel 97 being grooved to adapt the machine to be driven by a suitable motor. This wheel 97 is held to rotate on a sleeve 101 Fig. 7[a], which is held to the drive shaft 32 and is rotatably supported on the frame. The friction wheel or pulley 96 and belt wheel 97 are held to rotate together and are supported by the sleeve 101. A boss or collar 103 of the sleeve carries a clutch pin 104, which normally holds the said sleeve and the power and friction pulleys to rotate together. This pin or bolt 104 may be spring pressed in one direction and is provided with a projection,

which, when said bolt is released and given a partial turn, will hold said bolt disengaged from the power wheel 97. It will be seen that in the position shown in Fig. 7ª the power and friction wheels will be rotated independent of the shaft 32 and sleeve 101, and through the friction wheel 96 and mechanism already described, the knife 62 will be forced across the machine to cutting position, without operating the main drive shaft. This permits the front edge of the material of each new roll, if irregular, to be squared to the trimmed sides, or parts of the web to be cut off by releasing the operating lever 94 and the friction wheel 95 as described, without rotating the drive shaft and causing the roll 25 to feed the material after the parts are in position to cut the material transversely. By supporting the wheels on the sleeve 101 the shaft 32 may be readily removed without disturbing said wheels in case it is desired to remove the cutters to sharpen them, and the other end of said shaft as well as the shaft 34 may be likewise rotatably held in sleeves supported on the machine frame.

The shade-roller 28 may be of the usual or of any preferred construction. It is supported between two uprights or standards 105 and 106. At one end the shade-roller is supported in a center or tail piece 107. This center has an opening for the pin on the shade-roller, and has a shank 107ª which passes through an opening in the support 105. The center, Figs. 3 and 4, is normally forced inward by a spring 108, and has its inward movement limited by a washer 109. The opposite end of the shade-roller is supported by a revoluble head 110. This head has a shaft 111 which rotates in the support 106. The head has projections which engage parts of the roller to impart rotary motion to the latter. The shaft 111 is provided with a keyway or slot that is engaged by a key carried by the sleeve 112, by which said shaft and the head 110 may be adjustably held to rotate with the sleeve to permit the support 106 to be moved. A bracket 113 is held to a table 114, and in the upper end of the bracket the sleeve 112 is held to rotate. The sleeve has a collar at one end and at its other end is a pulley 115. A belt 116, Figs. 1 and 2, passes around the pulley 115 and around a pulley 117 on the sleeve 101 of the main drive shaft 32. The pulley 117 rotates with the belt wheel 97, and when said wheel 97 is operated, the head 110 will be rotated to wind the material on the shade-roller through the belt 116, which latter may be made so as to slip when necessary without operating the shade-roller and head 110. The supports 105 and 106 are adjustable on a slide or bed 118 by means of set-screws or in any other desired way. A projection 119 is held to the slide 118 which passes through a slot in the table 114, and has its lower end provided with a threaded aperture which is engaged by the threaded end of the bolt 120. The bolt 120 is held to rotate on the machine frame and is intended to bodily adjust the shade-roller and its supports in case the shade-roller is not winding the material thereon properly.

In operating the machine the material is passed around and between the rolls 25 and 26 and through the machine as shown in Fig. 2. The front edge of the material is fastened in the usual manner to the shade-roller, and the drive shaft started. This will feed and trim the material and will rotate the shade-roller to wind the proper amount of material thereon, at the same time the drum 93 will be rotated and will force the knife 62 across the machine to cutting position. The treadle 70 is now depressed to force the cross-head 53 downward so as to clamp the material between the stationary bar 52 and the clamping member 54 of said head. The lever 94 is raised so as to lower the friction wheel 95 and release the drum 93. This will permit the weight 90 and its connections to quickly force the knife in the opposite direction to cut the material, and as the material is being cut, or immediately thereafter, the treadle is further depressed which will cause the folding blade 56 to force the material adjacent to the knife between the part 76 and the creasing device 65, withdrawing the cut end from beneath the clamping member of the cross-head as shown in Fig. 13. Further movement of the head will be arrested by the device 65, and on further movement of the treadle, the folding blade 58 will engage the material and form a second bend and will force the material between the device 65 and the pivoted or swinging bar 79 as also shown in Fig. 13. The treadle is now released and the cams 80 moved to force the bar 79 and device 65 toward the part 76 of the stationary bar or member 52 to finish the folds or creases, the cams being released and the creasing devices permitted to return to their inactive position. This forms two distinct creases in the material at one end, and as soon as the creasing devices and the folded material are released the material will fold over in the manner substantially as shown in Fig. 14, after which it is stitched along the line *g*, thus completing the loop or socket into which the usual slat is slipped. One curtain or shade is now finished and the next is completed in a similar manner by placing a new shade-roller in the machine and bringing the severed edge of the stock forward and securing it to the roller and operating the parts as already described.

With some shade material it is difficult to start the knife to cut transversely unless clamped securely at its edge, and for this pur-

pose and to avoid making the springs of the yielding member 54 too strong, I provide a supplementary clamping device such as shown in Figs. 15 to 17, in which figures is also shown a slightly different means for operating the knife. To the stationary bar 52 is slidingly held a plate or rod 121 which is normally forced upward by a spring 122. The upper end of the rod 121 has a bar, member or device 123 held at right angles thereto, and on the under side of said member is a groove for passage of the transverse cutting knife 62. The lower end of the rod 121 is connected by a spring 124 to a lever 125, which when operated will force the clamping device so as to clamp the material at its edge between said device and the stationary member 52. In the path of the lever 125 is the end of a vertically movable rod 126 which is suitably guided on the machine frame. One end of this rod is fastened to an arm 127 which carries on its outer end a friction wheel 128 and a drum 129, the latter serving to force the knife into cutting position as previously described. The arm 127 is also fastened to a rod 130 around which is a spring 131 that normally forces the arm upward and causes the friction wheel 128 to engage the periphery of the wheel 132 on the drive shaft 32, by which the drum 129 is rotated from said drive shaft. The rod 130 is held in a socket in the end of a bolt 133, the end of which engages a threaded opening in a projection 134 on the frame, so that the tension on the spring 131 may be increased or diminished. The knife 62 being forced to the position shown in Fig. 16 by the rotation of the drum 129, and the lever 125 depressed, it will be seen that the edge of the material will be clamped between the device 123 and the bar 52, and on further movement of said lever it will engage the inward bent end of the rod 126 so as to disengage the wheel 128 from the wheel 132, to release the drum 129, thus permitting the weight to force the knife quickly across the machine to cut the material as in the other figures.

From the foregoing it will be seen that simple and efficient means is provided for supporting and acting on the shade material to form the shade-slat loop or socket, and that simple and efficient means is provided for automatically cutting the material transversely.

Instead of the arm 127 extending in the direction shown in Fig. 17, it might be made to extend as shown in dotted lines in said figure. If desired the supplementary clamping means may be dispensed with, or it may be operated in connection with the cross-head, and that the main clamping-member 54 of the cross-head may be made to clamp the material on both sides of the transverse cutting knife, either for a part or throughout its entire length, or other changes made without departing from the character of the invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a machine for making window shades, the combination with means for holding a web of shade material, of shade-roller holding means, means for rotating the shade-roller holding means to wind the material on the roller, means for trimming the edges of the material lengthwise thereof, a movable knife for cutting the material transversely, mechanism for creasing the material transversely thereof for forming the loop for the shade-slat and arranged in advance of the trimming means, together with mechanism for automatically actuating the knife and forcing it across the machine during its operation.

2. In a machine for making window shades, the combination with a frame and means for holding shade material, of means for winding the material on a shade-roller, trimming devices for trimming the edges of the material, mechanism for folding and creasing the material transversely thereof to form the loop for the shade-slat having two bends and an inturned end, a cutting device movable transversely of the machine, together with mechanism automatically forcing the cutting device across the machine to cut the material transversely.

3. In a machine of the character described, the combination with means for holding shade material, of means for rotating a shade-roller to wind the material thereon, folding means acting on the material and forming the loop for the shade-slat, a transversely movable knife, together with means for automatically forcing the knife across machine.

4. In a machine of the character described, the combination with means for holding the shade material, of folding and creasing means for folding and creasing the material transversely thereof and forming the loop for the shade-slat, a knife, and mechanism for automatically forcing the knife transversely of the machine to cut the material.

5. In a machine of the character described, the combination with a frame, of means for holding shade material on the frame, means for rotating a shade-roller for winding the material thereon, means having movable members clamping the material between them and forming a shade-slat loop or socket in which one end is bent inward within the loop, together with an automatically actuated device movable across the machine and cutting the material while clamped between the members.

6. In a machine for making window shades, the combination with means for hold-

ing shade material, of mechanism for forming a shade-slat loop or socket in the material having two bends with an inturned end extending within the loop, together with an automatically actuated knife adjacent to the loop-forming mechanism movable across the machine to cut the material transversely thereof.

7. In a machine of the character described, the combination with a frame, of a swinging member, a sliding member, means for operating the swinging and sliding members to crease the material, together with means for moving the material between the creasing members.

8. The combination of a stationary member, a creasing device slidingly held on the stationary member, a movable member coacting with said device and serving to form two creases in a part of the shade material, a vertically movable cross-head, and means for operating the parts.

9. In a machine for making window shades, the combination with creasing devices, of a cross-head movable toward and from the same, a blade carried directly by the cross-head, a second blade carried yieldingly thereby, said cross-head comprising two members relatively movable with respect to each other, and both of said members being adapted to clamp and hold the material against the creasing devices, and a knife movable under one of the members of the cross-head.

10. In a machine for making window shades, the combination with creasing devices, of a cross-head having a clamping member yieldingly held thereto and movable with the cross-head toward the creasing devices, and two blades movable with the cross-head and forcing the material between the creasing devices.

11. In a machine for making window shades, the combination with creasing devices, of a cross-head having a yielding clamping member movable therewith, means for forcing the cross-head toward the creasing devices, a blade fixed to the cross-head and adapted to force the material at one point between the creasing devices, a second blade normally movable with the cross-head and yieldingly held thereto adapted to force the material between the creasing devices at a different point from the first mentioned blade to form two distinct folds in the material, and means for operating the creasing devices.

12. In a machine for making window shades, the combination with means for forming a shade-slat loop or socket, transversely bodily movable cutting means adjacent to the loop-forming means, and automatic means for forcing said cutting means across the machine to cut the material.

13. In a machine for making window shades, the combination with means for holding the shade-material, of a cross-head having a yielding clamping member movable therewith, means for folding and creasing the material at two points to form a shade-slat loop or socket, and a knife bodily movable across the machine under the clamping member of the cross-head to cut the material transversely.

14. In a machine for making window shades, the combination with means for holding shade material, of a cross-head having a yielding clamping member movable therewith, means for folding and creasing the material at two points to form a shade-slat loop or socket, a supplemental clamping device independent of the cross-head, a knife movable across the machine under the clamping member of the cross-head to cut the material transversely, and means for operating the knife.

15. In a machine for making window shades, the combination with means for holding shade material, of means for folding and creasing the material transversely to form a shade-slat loop or socket, a knife adapted to move across the machine to cut the material transversely, means for forcing the knife transversely in one direction during the operation of the machine, together with means for forcing the knife in the opposite direction to cut the material when the first mentioned knife operating means is released.

16. In a machine for making window shades, the combination with means for holding shade material, of means for folding and creasing the material transversely to form a shade-slat loop or socket, a supplemental clamping device, a knife adapted to move across the machine to cut the material transversely, means for forcing the knife transversely in one direction during the operation of the machine, together with means for forcing the knife in the opposite direction to cut the material when the first mentioned knife operating means is released.

17. In a machine for making window shades, the combination with means for holding shade material, of means for folding and creasing the material transversely to form a shade-slat loop or socket, a bodily movable knife adapted to move across the machine to cut the material transversely, a drum, and means for rotating the drum to force the knife transversely in one direction, together with means for forcing the knife in the opposite direction to cut the material, when the drum is released.

18. In a machine for making window shades, the combination with means for holding shade material, of means for folding and creasing the material transversely to form a shade-slat loop or socket, a supplemental clamping device, means for operating said device, a knife adapted to move across

the machine to cut the material transversely, means for forcing the knife transversely in one direction, together with means for forcing the knife in the opposite direction to cut the material when the first mentioned knife operating means is released, said releasing being effected by the same movement that operates the supplemental clamping device.

19. In a machine for making window shades, the combination with means for holding shade material, of means for forming a shade-slat loop, a knife adapted to move across the machine to cut the material transversely, a drum and means for frictionally actuating the drum to force the knife in one direction, and means for forcing the knife in the opposite direction when the drum is released.

20. In a machine for making window shades, the combination with means for holding shade material, of means for forming a shade-slat loop, a knife adapted to move across the machine to cut the material transversely, a drum, means including a flexible connection for actuating the drum to force the knife in one direction, and means including a flexible connection acting against the movement of the drum to force the knife in the opposite direction when the drum is released.

21. In a machine for making window shades, the combination with means for holding shade material, of means for folding and creasing the material at two distinct points to form a shade-slat loop or socket, a cutting device, a drum and power driven friction means for normally rotating the drum to force the cutting device across the machine in one direction, and a weight for forcing said device across the machine to cut the material transversely when the friction means for operating the drum is released.

22. In a machine of the character described, the combination with means for holding shade material, of a knife adapted to move transversely thereto to cut the material, loop-forming mechanism, means for automatically forcing the knife bodily in one direction across the machine, together with means for bodily forcing the knife in the opposite direction when the former means is released.

23. In a machine for making window shades, the combination with loop-forming means having movable and stationary members, of means for supporting shade material, a knife slidingly held in a stationary member of the loop-forming means, means for automatically forcing the knife in one direction across the machine, and a weight connected to the knife for forcing the latter in the opposite direction to cut the material when the automatic means is released.

24. In a machine for making window shades, the combination with a stationary member, of means for supporting the material above said member, a knife slidingly held in the stationary member, a drum and means for actuating the drum to force the knife in one direction across the machine, and a weight connected to the knife for operating the latter in the opposite direction.

25. In a machine for making window shades, the combination with a stationary member, of means for supporting the material above said member, a knife-bar carrying a knife and slidingly held in a groove in the stationary member, a flexible connection, a drum and means for actuating the drum to force the knife bodily in one direction across the machine, a flexible connection, and a weight connected to the knife for operating the latter in the opposite direction.

26. In a machine for making window shades, the combination with a stationary member, of means for supporting the material above said member, a cutting device slidingly held in the stationary member, a drum, frictionally actuated means for rotating the drum to force the cutting device in one direction across the machine, and a weight connected to the device for operating the latter in the opposite direction.

27. In a machine for making window shades, the combination with means for holding shade material, of a knife-bar and a knife securely held in said bar, a flexible connection, a weight and connections for operating the knife-bar in one direction to cut the material transversely, a drum, a flexible connection between the drum and knife-bar, a friction pulley, a power pulley normally in engagement with the friction pulley adapted to operate the drum to force the knife in the opposite direction, and means for operating the friction pulley to release the drum and cause the weight to force the knife across the machine to cut the material.

28. In a machine for making window shades, the combination with means for holding shade material, of a knife-bar and a knife securely held in said bar, a flexible connection, a weight and drum connections for operating the knife-bar in one direction to cut the material transversely, a drum, a flexible connection between the drum and the knife-bar, a friction pulley, a second pulley normally in engagement with the friction pulley, adapted to operate the drum to force the knife in the opposite direction, and a lever for operating the friction pulley to release the drum and cause the weight to force the knife in the opposite direction to cut the material.

29. The combinaiton with means for folding and creasing the shade material at two points, of a supplementary yielding clamping device adjacent to the folding and creasing means adapted to clamp the material at its edge, and a device for cutting the material.

30. In a machine of the character described, the combination with means for holding shade material, of means for creasing and folding the material, a yielding supplementary clamping device adjacent to the creasing and folding means, a knife movable under the supplementary yielding clamping device, and means for operating the clamping device to hold the material during the cutting operation.

31. In a machine for making window shades, the combination with means for holding shade material, of means for creasing the material transversely for the shade-slat loop or socket, a bodily movable knife adapted to move across the machine to cut the material transversely, a drum, and means for rotating the drum to force the knife transversely.

32. In a machine for making window shades, the combination with means for holding shade material, of means for creasing the material transversely for the shade-slat loop or socket, a knife adapted to move across the machine to cut the material transversely, a drum having a proportionately large surface to give a quick throw to the knife, and means for rotating the drum to force the knife transversely.

33. In a machine of the character described, the combination with means for holding shade material, of means for creasing the material transversely thereof to form the loops for the shade-slat, a knife, mechanism for forcing the knife transversely of the machine to cut the material, and means for winding the shade in a roll.

34. In a machine for making window shades, the combination with means for holding shade material, of mechanism for creasing the material transversely thereof for the shade-slat loop, a knife adjacent to the creasing mechanism movable across the machine to cut the material transversely thereof, and means for positively forcing the knife across the machine.

35. In a machine for making window shades, the combination with means for creasing the material transversely for the shade-slat loop or socket, transversely bodily movable cutting means adjacent to the creasing means, and means for positively forcing said cutting means across the machine to cut the material.

36. In a machine for making window shades, the combination with means for holding shade material, of means for creasing the material transversely to form a shade-slat loop or socket, a knife adapted to move across the machine to cut the material transversely, means for forcing the knife transversely, and means for cutting the material lengthwise thereof.

37. In a machine for making window shades, the combination with means for holding shade material, of means for creasing the material transversely for the shade-slat, a knife adapted to move across the machine to cut the material transversely, a drum, means for actuating the drum to force the knife transversely, cutters for trimming the material lengthwise thereof, and means for winding the shade after the loop is formed in a roll.

38. In a machine for making window shades, the combination with means for holding shade material, of means for creasing the material for forming a shade-slat loop, a knife adapted to move across the machine to cut the material transversely, a drum, and means including a flexible connection for actuating the drum to force the knife transversely.

39. In a machine for making window shades, the combination with means for holding shade material, of means for creasing the material for forming a shade-slat loop or socket, a cutting device, a drum, means for rotating the drum to force the cutting device across the machine, cutters for cutting the material lengthwise, means for forcing the material through the machine, and means for automatically rolling the shade.

40. In a machine for making window shades, the combination with a stationary member, means for supporting the shade material, means for creasing the material transversely, means carrying a knife movable along the stationary member, a flexible connection, a drum to which the flexible connection is attached, and means for actuating the drum to force the knife bodily across the machine.

41. In a machine of the character described, the combination with means for holding shade material, of means for creasing and folding the material, a supplementary clamping device adjacent to the creasing and folding means, a knife movable under the supplementary clamping device, means for operating the clamping device to hold the material during the cutting operation, mechanism for forcing the knife across the machine, together with means operated during the movement of the clamping member and for automatically releasing the knife actuating mechanism for the purpose set forth.

42. In a machine of the character described, the combination with means for holding shade material, of means for creasing and folding the material, a supplementary clamping device adjacent to the creasing and folding means, a knife movable under the supplementary yielding clamping device, a lever and connections for operating the clamping device to hold the material during the cutting operation, mechanism for forcing the knife across the machine, together with a rod actuated by the lever to automatically release the knife operating mechanism for the purpose set forth.

43. In a machine for making window shades, the combination with means for holding shade material, of a drive shaft, a sleeve rotatable with the shaft and secured thereto, a power pulley loosely held on the sleeve, a device normally holding the sleeve and pulley to rotate together but which permits the pulley to be rotated independent of the sleeve, a transversely movable knife, means for operating the knife in one direction to cut the material and connections between the knife and the pulley whereby said knife may be operated with or independent of the drive shaft for the purpose set forth.

44. The combination with means for holding shade material, of two sets of cutters arranged in pairs for cutting the material lengthwise thereof, a chain, means for holding one set of cutters to the chain, shafts for operating the sets of cutters, together with means for moving the chain so as to quickly adjust one set of cutters along the shafts.

45. The combination with means for holding shade material, of a pair of cutters arranged for cutting the material lengthwise thereof, a chain, means for holding the cutters to the chain, shafts for operating the cutters, together with means for moving the chain so as to quickly adjust the cutters along the shafts.

46. In a machine of the character described, the combination of a set of rotary cutters arranged one above the other, a bracket movable with the cutters, a chain attached to the bracket, and means for moving the chain to give quick adjustment to the cutters.

47. In a machine of the character described, the combination with two shafts arranged to rotate in unison, two sets of cutters slidingly held on said shafts, brackets in which the cutters are held to rotate, a chain secured to the brackets of one set of cutters, means for operating the chain for giving quick adjustment to said set of cutters, and a bolt engaging the brackets of the other set of cutters for giving a less adjustment thereto.

48. In a machine for making window shades, the combination with two standards or supports, of two independently movable parts for revolubly supporting a shade-roller in the standards, a slide on which the standards are adjustably held, together with means for moving and adjusting the slide and roller supports bodily.

49. In a machine for making window shades, the combination with suitable supports for revolubly holding a shade-roller, of means for adjusting the supports, a head supporting and adapted to engage one end of the roller to rotate the latter, means for rotating the head, and a spring-pressed tail piece or center for the other end of the roller.

EPHRAIM O. ENGBERG.

Witnesses:
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