

June 8, 1965

W. E. VAN HORNE ET AL

3,188,652

HOLDING AND POSITIONING APPARATUS

Filed June 6, 1961

2 Sheets-Sheet 1

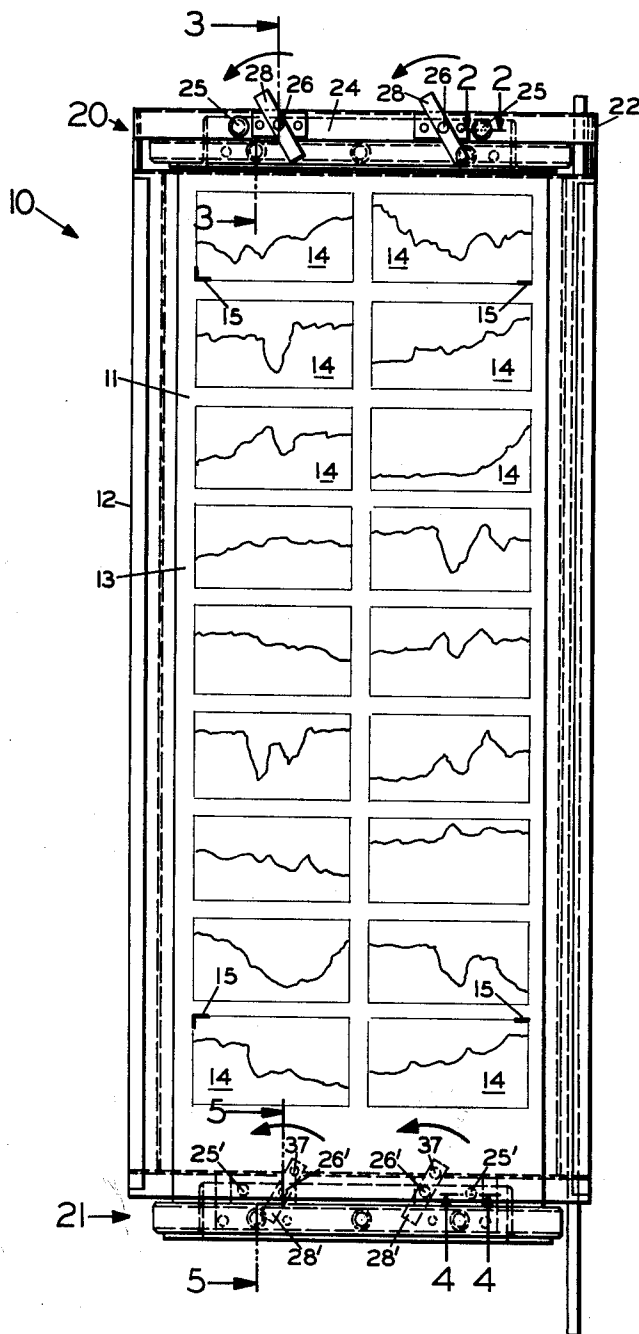


FIG. 1

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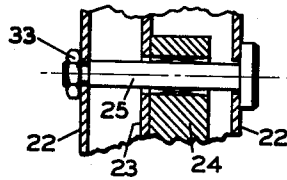


FIG. 2

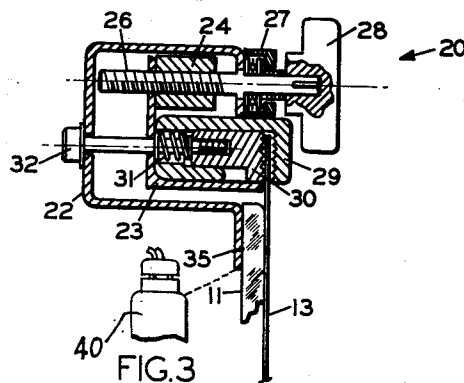


FIG. 3

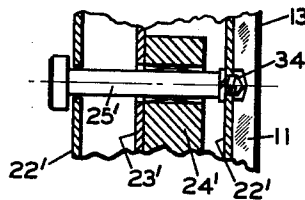


FIG. 4

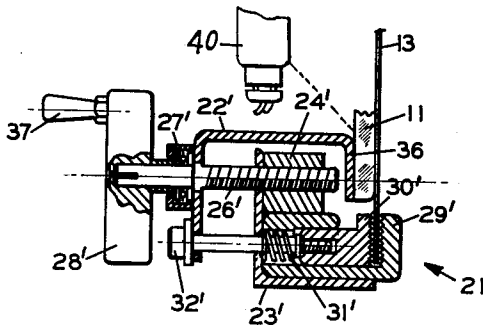


FIG. 5

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HOLDING AND POSITIONING APPARATUS

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7 Claims. (Cl. 346—134)

This invention relates to holding and positioning apparatus. It has to do particularly with apparatus for holding paper and like material in a predetermined position in such manner as to prevent any movement of the material from such position and any dimensional change in the material that might otherwise result from variations in ambient conditions such as humidity.

Such apparatus is especially useful for holding paper and like material against a flat surface or a smoothly curved convex surface for visible recording thereon. Changes in position or dimension of the coordinates marked on charts or graphs can cause inaccuracies in the recording of data thereon. Where measured data or other information must be recorded with maximum accuracy, it is necessary that the material on which the record is to be marked be held in a fixed position and in such manner that the material cannot expand or contract. The apparatus of the present invention provides the necessary positional and dimensional stability.

Typical apparatus according to this invention for placing and holding paper and like material in a predetermined position suitable for visible recording thereon in such manner as to prevent any movement of the material from such position and any dimensional change in the material that might otherwise result from variations in ambient conditions such as humidity, comprises: a rectangular platen, preferably made of a material capable of transmitting light therethrough (that is, either transparent or translucent) and having a surface thereon (such as a flat or smooth-curved convex surface) capable of providing a solid backing for at least a portion of a sheet of material that may be held thereon; at least one mark, preferably on the surface in the vicinity of each corner of the platen to serve as a guide line for a similar mark on the sheet of material; illuminating means, such as at least one light behind the platen providing light of sufficient intensity to penetrate the platen and the sheet of material held thereon so as to make the marks visible through the sheet of material; a sheet of material, such as paper capable of transmitting light therethrough (that is, either transparent or translucent), having marks thereon corresponding at least in part to the marks on the platen, which marks on the sheet of material may comprise portions of recording indicia such as coordinate markings on the sheet of material, such as at least one rectangular chart frame, graph, or the like, and a gripping and positioning mechanism adjacent each of a pair of opposite ends of the platen.

Each gripping and positioning mechanism comprises means for gripping one end of the sheet of material and for adjustably positioning the end in such manner as to place the marks on the sheet of material in registry with the marks on the platen in the vicinity of each corner thereof. The sheet of material is stretchable in the direction between the opposite ends wherein it is gripped by the mechanisms. Independently adjustable positioning means are provided in each mechanism in the vicinity of each extremity of the end of the material gripped by the mechanism.

Each gripping and positioning mechanism comprises a stationary member or housing fixedly attached to the platen; a plurality of guide pins fixedly attached to the housing; a support member extending substantially the

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width of the mechanism; a guide member extending substantially the width of the mechanism, fixedly attached to the support member and slidably mounted on the guide pins; a pair of manually adjustable means mounted on the housing, one in the vicinity of each end thereof; each threadedly connected to the guide member; an outer clamp jaw fixedly attached to the support member and extending substantially the width of the sheet of material; an inner clamp jaw extending substantially the width of the outer clamp jaw and slidably mounted in the outer clamp jaw; yieldable compression spring means normally pressing the clamp jaws tightly together to hold the end of the sheet of material firmly between the clamping edges of the clamp jaws. Means such as shoulder screws fixedly attached to the inner clamp jaw through the housing are provided for limiting one extreme position of the inner clamp jaw so that the outer clamp jaw can be moved relative to the inner clamp jaw so as to provide an opening between the clamping edges of the clamp jaws to provide space for inserting the end of the sheet of material between the clamping edges.

Described in less detail, each gripping and positioning mechanism comprises a stationary member fixedly attached to the platen; a first clamp jaw slidably mounted in the stationary member; a pair of spaced-apart manually adjustable means for positioning the first clamp jaw; a second clamp jaw slidably mounted adjacent the first clamp jaw; yieldable means normally pressing the clamp jaws tightly together to hold the end of the sheet of material firmly between the clamping edges of the clamp jaws; and means for limiting one extreme position of the second clamp jaw to permit movement of the first clamp jaw relative to the second clamp jaw to provide an opening between the clamping edges of the clamp jaws.

Adjustment of the manually adjustable means in a given direction first causes the clamping edges to close and grip the end of the sheet of material, then pulls the sheet of material tight and increasingly tighter against the platen. Further adjustment of the manually adjustable means within the range of adjustment wherein the clamping edges of the jaws tightly grip the end of the sheet of material enables the sheet of material to be adjustably positioned so as to make the marks thereon register with the marks on the platen.

The sheet of material preferably comprises paper positioned in the apparatus with the machine direction of the paper substantially parallel to the opposite ends of the platen where the gripping and positioning mechanisms hold the paper, whereby the paper remains substantially free from stress in its machine direction and is stretched by the mechanisms perpendicular to the machine direction. The paper may be used to record values of a dependent variable as a function of an independent variable, such as time. The values of the independent variable should be indicated in the direction substantially parallel to the machine direction of the paper and the values of the dependent variable should be indicated in substantially the direction in which the paper is stretched by the gripping and positioning mechanisms.

The sheet of material may be slipped between the open clamping edges of the gripping and positioning mechanisms at each opposite end, then roughly positioned relative to the marks on the platen, then gripped by manual adjustment of the manual adjusting means in the gripping and positioning mechanisms, then stretched progressively more tightly against the platen and adjusted at both opposite ends of the platen in any convenient order until the sheet of material is precisely positioned relative to the marks on the platen. The manually adjustable means first cause the clamp jaws to close against the sheet of material, then stretch the sheet of material into position with the marks on the sheet of material in registry with

the marks on the platen, with the sheet of material held tight against the platen under sufficient tension that the sheet of material cannot shrink or expand. The sheet of material is held under sufficient tension that it cannot shrink, and is stretched to a greater extent than it would expand of its own accord even under extreme ambient conditions, whereby the sheet of material cannot expand or become loose on the platen, and thus is firmly held to its proper dimension and position.

In the drawings:

FIG. 1 is a front plan view of typical holding and positioning apparatus according to the present invention.

FIG. 2 is a sectional view taken on the plane 2—2 of FIG. 1.

FIG. 3 is a sectional view taken on the plane 3—3 of FIG. 1.

FIG. 4 is a sectional view taken on the plane 4—4 of FIG. 1.

FIG. 5 is a sectional view taken on the plane 5—5 of FIG. 1.

Typical holding and positioning apparatus 10 according to the present invention comprises a platen 11 held by a framework 12. The platen 11 is made of transparent or translucent material such as a heavy rigid plastic sheet, and the frame 12 is made of any suitably strong material such as steel. The platen 11 provides a solid backing for a sheet of paper 13 which may have chart frames 14—14 printed or otherwise marked thereon. Typical chart frames 14 are rectangular as shown in FIG. 1 and may have therein coordinate markings such as rectangular, semilog, log-log, square root, or any other desired coordinates or markings. Scribe marks or guide lines 15—15 are provided on the platen 11. Preferably one guide line 15 is provided near each corner of the platen 11, each guide line 15 coinciding with the proper position for a similar line on the paper 13, such as a line defining a chart frame as shown in FIG. 1.

The top and bottom ends of the frame work 12 include paper holding and positioning mechanisms 20, 21, respectively. In the top mechanism 20, a stationary frame member or housing 22, which is fixedly attached to the platen 11, provides a housing and mounting for most of the other components of the top mechanism 20. A right angled support member 23, which extends substantially the width of the top mechanism 20 has rigidly affixed thereto a guide member 24 which is slidably mounted by means of holes therein on a plurality of guide pins 25, which are rigidly mounted on the housing 22. The position of the guide member 24 is controlled through threaded holes, one near each end of the guide member 24, by means of thumb screws 26 each of which is rotatably mounted on the housing 22 through a thrust bearing 27. Each thumb screw 26 is manually controlled by a handle 28.

Also fixedly attached to the angle support 23 is an outer clamp jaw 29. An inner clamp jaw 30 is slidably mounted in the outer clamp jaw 29. A strong compression spring 31 normally presses the clamp jaws 29, 30 tightly together holding the paper 13 firmly between their two clamping edges. The forwardmost position of the inner clamp jaw 30 is limited however by a shoulder screw 32 to which the inner clamp jaw 30 is fixedly threaded. In FIG. 3, the inner clamp jaw 30 is shown in its forwardmost position as limited by the shoulder screw 32, while the outer clamp jaw 29 has been moved forward by the thumb screw 26 far enough to provide space for inserting the paper 13 between it and the inner clamp jaw 30.

After the paper has been inserted between the clamp jaws 29, 30 the handle 28 of the thumb screw 26 is turned so as to move the outer clamp jaw 29 back against the inner clamp jaw 30. The inner clamp jaw 30 remains pressed forward by the spring 31 to its forwardmost position as shown in FIG. 3 until the outer clamp jaw 29 is firmly pressed against the paper 13 and the inner clamp

jaw 30, and further turning of the handle 28 in the same direction moves everything mounted on the angle support 23, including the inner upper end of the clamp jaw 30 and the shoulder screw 32, back, pulling the paper 13 to its desired position.

The bottom paper holding and positioning mechanism 21 may be identical to the top mechanism 20 (turned upside down, of course), and in some equipment it would be preferred that the top and bottom mechanisms 20, 21 be identical, because of savings in the cost of manufacture. Where it is preferred that the mechanism not extend any farther beyond or in front of the platen than is necessary, however, and where it is possible to control the mechanism from behind, the arrangement shown in the drawings, especially FIGS. 4 and 5, is preferable.

The bottom mechanism 21 is essentially the same as the top mechanism 20. The components 22'—32' of the bottom mechanism 21 are identical to those of the top mechanism 20 having the same reference numerals without primes, except for a few minor differences mentioned below. Each guide pin 25 of the top mechanism 20 is conveniently held in place by a nut 33 as indicated in FIG. 2, while each guide pin 25' in the bottom mechanism 21 is more conveniently held in place by a threaded connection to the housing 22' as indicated at 34 in FIG. 4. The housing 22 of the top mechanism 20 is connected at its lower end to the platen 11 as is indicated at 35 in FIG. 3, while the housing 22' of the bottom mechanism 21 is connected at its upper end to the platen 11 as is indicated at 36 in FIG. 5. The housing 22' of the bottom mechanism 21 differs from the housing 22 of the top mechanism 20 in that the housing 22' is cut off just below the shoulder screw 32'. The thumbscrew 26' is mounted in the housing 22' so as to extend toward the back of the bottom mechanism 21 as shown in FIG. 5, rather than to the front as in the top mechanism 20 shown in FIG. 3. For convenience in reaching and turning the handles 28' in the bottom mechanism 21, a knob 37 preferably is provided on each handle 28'. While the angle support 23' and the guide member 24' of the bottom mechanism 21 are mounted in the same positions as are the angle support 23 and guide member 24 of the top mechanism 20 (as is apparent from FIG. 5 and FIG. 3), the clamp jaws 29', 30' are positioned in the bottom mechanism 21 in the position that is upside down as compared to the position of the clamps 29, 30 of the top mechanism 20, so that the opening between the clamp jaws 29', 30' is in the upward direction to receive the paper 13. The operation of the bottom mechanism 21 is identical to that of the top mechanism 20, except that it is controlled from behind rather than from in front.

The paper holding and positioning apparatus 10 is employed in the following manner:

The paper 13, which preferably is a good grade of map paper, is placed roughly in position on the platen 11. The machine direction, or "grain," of the paper 13 is in the horizontal direction. The paper 13 is inherently stable in the machine direction, and need not be stressed in this direction; especially where, as in the typical apparatus described herein, the horizontal direction on the charts represents the independent variable, such as time. The charts 14—14 have been printed on the paper 13 in a predetermined manner such that portions of them will coincide with the guide lines 15—15 when the paper 13 is correctly positioned and sufficiently stretched. Lights 40 (FIGS. 3 and 5) preferably are provided behind the platen 11 to facilitate lining up the appropriate markings on the paper 13 with the guide lines 15—15 on the platen 11, and to aid in reading the charts 14—14.

The thumb screws 26, 26' of the top and bottom mechanisms 20, 21 are turned until the jaws of the clamps 29, 30 and 29', 30' open. The paper 13 is slipped between the open jaws at both top and bottom, and is roughly positioned relative to the guide lines 15—15. The thumbscrews 26 of the top mechanism 20 are turned by

the handles 28 until the clamps 29, 30 close against the top end of the paper 13. The thumbscrews 26' of the bottom mechanism 21 are turned by the handles 28' until the clamps 29', 30' close against the bottom end of the paper 13. The thumbscrews 26, 26' are then further tightened and adjusted on both sides at both top and bottom, in any convenient order, until the paper is precisely positioned relative to the guide lines 15—15.

The same thumbscrews 26, 26' in the clamping and positioning mechanisms 20, 21 first cause the clamps 29, 30 and 29', 30' to close against the paper 13; and then after the paper 13 is tightly clamped, they stretch the paper 13. When the paper 13 is finally stretched into position, it is under very high tension, which holds it tight against the flat platen 11. As humidity changes, the tension increases and decreases, and the paper 13 would thus tend to shrink or expand. However, the paper 13 cannot shrink or expand, since it is firmly held to the proper dimension. The clamps 29, 30, 29', 30' do not permit the paper 13 to shrink, and the amount of pre-stretch they provide in the paper 13 is enough to assure that even under the most extreme conditions of humidity it cannot become loose, because it is stretched farther than it would ever expand of its own accord even under the most extreme conditions.

The apparatus as disclosed herein is especially useful for automatic visible recording of dependent variables against an independent variable such as time. The apparatus may be used for other types of recording, however, and for other purposes wherein accuracy must be assured. In fact where extreme accuracy is desirable in all directions, holding and positioning mechanisms may be provided on all four sides of the platen, to provide precise adjustment of the paper in all directions and positive holding of the paper in position against any dimensional change in any direction. In some types of recording and various other uses, the stretched paper may be strong enough not to require backing from the platen except in the vicinity of the edges. In apparatus for such uses the center portion of the platen may be omitted, so that the platen has more the form of a stretching frame than of a backing member. In some apparatus the guide marks of the platen may be replaced by any other suitable location indicators, such as clamps fitting over the front of the paper, light beams, sighting devices, or other means for defining predetermined locations on the apparatus.

To summarize, typical apparatus 10 according to the present invention for placing and holding paper and like material 13 in a predetermined position suitable for visible recording thereon in such manner as to prevent any movement of the material 13 from such position and any dimensional change in the material 13 that might otherwise result from variations in ambient conditions such as humidity, comprises: a rectangular platen 11, preferably made of a material capable of transmitting light therethrough (that is, either transparent or translucent) and having a surface thereon (such as a flat or smooth-curved convex surface) capable of providing a solid backing for at least a portion of a sheet of material 13 that may be held thereon; at least one mark 15 preferably on the surface in the vicinity of each corner of the platen 11 to serve as a guide line for a similar mark 14 on the sheet of material 13; illuminating means, such as at least one light behind the platen 11 providing light of sufficient intensity to penetrate the platen 11 and the sheet of material 13 held thereon so as to make the marks 15—15 visible through the sheet of material 13; a sheet of material, such as paper 13 capable of transmitting light therethrough (that is, either transparent or translucent), having marks 14—14 thereon corresponding at least in part to the marks 15—15 on the platen 11, which marks 14—14 on the sheet of material may comprise portions of recording indicia such as coordinate markings on the sheet of material 13 such as at least

one rectangular chart frame, graph, or the like; and a gripping and positioning mechanism 20, 21 adjacent each of a pair of opposite ends of the platen 11.

Each gripping and positioning mechanism 20, 21 comprises means 29, 30 for gripping one end of the sheet of material 13 and for adjustably positioning the end in such manner as to place the marks 14—14 on the sheet of material in registry with the marks 15—15 on the platen 11 in the vicinity of each corner thereof. The sheet of material 13 is stretchable in the direction between the opposite ends wherein it is gripped by the mechanisms 20, 21. Independently adjustable positioning means 26, 27, 28 are provided in each mechanism 20, 21 in the vicinity of each extremity of the end of the material 13 gripped by the mechanism 20, 21.

Each mechanism 20, 21 comprises a stationary member or housing 22 fixedly attached to the platen 11; a plurality of guide pins 25 fixedly attached to the housing 22; a support member 23 extending substantially the width of the mechanism 20, 21; a guide member 24 extending substantially the width of the mechanism 20, 21, fixedly attached to the support member 23 and slidably mounted on the guide pins 25; a pair of manually adjustable means 26, 27, 28 mounted on the housing 22, one in the vicinity of each end thereof; each threadedly connected to the guide member 24; an outer clamp jaw 29 fixedly attached to the support member 23 and extending substantially the width of the sheet of material 13; an inner clamp jaw 30 extending substantially the width of the outer clamp jaw 29 and slidably mounted in the outer clamp jaw 29; yieldable compression spring means 31 normally pressing the clamp jaws 29, 30 tightly together to hold the end of the sheet of material 13 firmly between the clamping edges of the clamp jaws 29, 30. Means such as shoulder screws 32 fixedly attached to the inner clamp jaw 30 through the housing 22 are provided for limiting one extreme position of the inner clamp jaw 30 so that the outer clamp jaw 29 can be moved relative to the inner clamp jaw 30 so as to provide an opening between the clamping edges of the clamp jaws 29, 30 to provide space for inserting the end of the sheet of material 13 between the clamping edges.

Described in less detail, each gripping and positioning mechanism 20, 21 comprises a stationary member 22 fixedly attached to the platen 11; a first clamp jaw 29 slidably mounted (23, 24, 25) in the stationary member 22; a pair of spaced-apart manually adjustable means 26, 27, 28 for positioning the first clamp jaw 29; a second clamp jaw 30 slidably mounted adjacent the first clamp jaw 29; yieldable means 31 normally pressing the clamp jaws 29, 30 tightly together to hold the end of the sheet of material 13 firmly between the clamping edges of the clamp jaws 29, 30; and means 32 for limiting one extreme position of the second clamp jaw 30 to permit movement of the first clamp jaw 29 relative to the second clamp jaw 30 to provide an opening between the clamping edges of the clamp jaws 29, 30.

Adjustment of the manually adjustable means 26, 27, 28 in a given direction first causes the clamping edges to close and grip the end of the sheet of material 13, then pulls the sheet of material 13 tight and increasingly tighter against the platen 11. Further adjustment of the manually adjustable means 26, 27, 28 within the range of adjustment wherein the clamping edges of the jaws 29, 30 tightly grip the end of the sheet of material 13 enable the sheet of material 13 to be adjustably positioned so as to make the marks 14—14 thereon register with the marks 15—15 on the platen 11.

The sheet of material 13 preferably comprises paper positioned in the apparatus 10 with the machine direction of the paper 13 substantially parallel to the opposite ends of the platen where the gripping and positioning mechanisms 20, 21 hold the paper 13, whereby the paper 13 remains substantially free from stress in its machine direction and is stretched by the mechanisms 20, 21 per-

pendicular to the machine direction. The paper 13 may be used to record values of a dependent variable as a function of an independent variable, such as time. The values of the independent variable should be indicated in the direction substantially parallel to the machine direction of the paper 13 and the values of the dependent variable should be indicated in substantially the direction in which the paper is stretched by the gripping and positioning mechanisms 20, 21.

The sheet of material 13 may be slipped between the open clamping edges of the gripping and positioning mechanisms 20, 21 at each opposite end, then roughly positioned relative to the marks 15—15 on the platen 11, then gripped by manual adjustment of the manual adjusting means 26, 27, 28 in the gripping and positioning mechanisms 20, 21, then stretched progressively more tightly against the platen 11 and adjusted at both opposite ends of the platen 11 in any convenient order until the sheet of material 13 is precisely positioned relative to the marks 15—15 on the platen 11. The manually adjustable means 26, 27, 28 first cause the clamp jaws 29, 30 to close against the sheet of material 13, then stretch the sheet of material 13 into position with the marks 14—14 on the sheet of material 13 in registry with the marks 15—15 on the platen 11, with the sheet of material 13 held tight against the platen 11 under sufficient tension that the sheet of material 13 cannot shrink or expand. The sheet of material 13 is held under sufficient tension that it cannot shrink, and is stretched to a greater extent than it would expand of its own accord even under extreme ambient conditions, whereby the sheet of material 13 cannot expand or become loose on the platen 11, and thus is firmly held to its proper dimension and position.

The reference characters in the above summary indicate generally the primary components shown in the drawings corresponding to the recited features, to facilitate understanding of the claims. The reference characters are used merely by way of example, however, and not in any limiting sense.

While the form of the invention herein disclosed constitutes a preferred embodiment, it is not intended to describe all of the possible equivalent forms or ramifications of the invention. It will be understood that the words used are words of description rather than of limitation, and that various changes, as in shape, relative size, and arrangement of parts, may be made without departing from the spirit or scope of the invention.

What is claimed is:

1. Apparatus for placing and holding paper and like material in a predetermined position suitable for visible recording thereon in such manner as to prevent any movement of said material from such position, comprising: a platen having a surface thereon capable of providing a solid backing for at least a portion of a sheet of material that may be held thereon; at least one mark in the vicinity of each corner of said platen to serve as a guide line for a similar mark on the sheet of material; a sheet of material having marks thereon corresponding at least in part to said marks in the vicinity of the corners of said platen and located such that the respective corresponding portions of said marks can be made to register in the vicinity of each corner when said sheet is correctly positioned and stretched; and a gripping and positioning mechanism adjacent each of a pair of opposite ends of said platen, each said gripping and positioning mechanism comprising means for gripping one end of said sheet of material and for adjustably stretching said sheet and positioning said end in such manner as to place said marks on said sheet of material in registry with said marks in the vicinity of each corner of said platen, and including a stationary member fixedly attached to said platen; a first clamp jaw slidably mounted in said stationary member; a pair of spaced-apart manually adjustable means for positioning said first clamp jaw; a second clamp jaw slidably mounted adjacent said first clamp jaw; yield-

able means normally pressing said clamp jaws tightly together to hold said end of said sheet of material firmly between the clamping edges of said clamp jaws; and means for limiting one extreme position of said second clamp jaw to permit movement of said first clamp jaw relative to said second clamp jaw to provide an opening between the clamping edges of said clamp jaws.

2. Apparatus for placing and holding paper and like material in a predetermined position suitable for visible recording thereon in such manner as to prevent any movement of said material from such position, comprising: a platen having a surface thereon capable of providing a solid backing for at least a portion of a sheet of material that may be held thereon; at least one mark in the vicinity of each corner of said platen to serve as a guide line for a similar mark on the sheet of material; a sheet of material having marks thereon corresponding at least in part to said marks in the vicinity of the corners of said platen and located such that the respective corresponding portions of said marks can be made to register in the vicinity of each corner when said sheet is correctly positioned and stretched; and a gripping and positioning mechanism adjacent each of a pair of opposite ends of said platen, each said gripping and positioning mechanism comprising means for gripping one end of said sheet of material and for adjustably stretching said sheet and positioning said end in such manner as to place said marks on said sheet of material in registry with said marks in the vicinity of each corner of said platen, and including a housing fixedly attached to said platen; a plurality of guide pins fixedly attached to said housing; a support member extending substantially the width of said mechanism; a guide member extending substantially the width of said mechanism, fixedly attached to said support member and slidably mounted on said guide pins; a pair of manually adjustable means mounted on said housing, one in the vicinity of each end thereof, each threadedly connected to said guide member; an outer clamp jaw fixedly attached to said support member and extending substantially the width of said sheet of material; an inner clamp jaw extending substantially the width of said outer clamp jaw and slidably mounted in said outer clamp jaw; compression spring means normally pressing said clamp jaws tightly together to hold said end of said sheet of material firmly between the clamping edges of said clamp jaws; means for limiting one extreme position of said inner clamp jaw so that said outer clamp jaw can be moved relative to said inner clamp jaw so as to provide an opening between the clamping edges of said clamp jaws to provide space for inserting said end of said sheet of material between said clamping edges.

3. Apparatus for placing and holding paper and like material in a predetermined position suitable for visible recording thereon in such manner as to prevent any movement of said material from such position, comprising: a platen having a surface thereon capable of providing a solid backing for at least a portion of a sheet of material that may be held thereon; at least one mark in the vicinity of each corner of said platen to serve as a guide line for a similar mark on the sheet of material; a sheet of material having marks thereon corresponding at least in part to said marks in the vicinity of the corners of said platen and located such that the respective corresponding portions of said marks can be made to register in the vicinity of each corner when said sheet is correctly positioned and stretched; and a gripping and positioning mechanism adjacent each of a pair of opposite ends of said platen, each said gripping and positioning mechanism comprising means for gripping one end of said sheet of material and for adjustably stretching said sheet and positioning said end in such manner as to place said marks on said sheet of material in registry with said marks in the vicinity of each corner of said platen, and including a housing fixedly attached to said platen; a plurality of guide pins fixedly attached to said housing; a support

member extending substantially the width of said mechanism; a guide member extending substantially the width of said mechanism, fixedly attached to said support member and slidably mounted on said guide pins; a pair of manually adjustable means mounted on said housing, one in the vicinity of each end thereof, each threadedly connected to said guide member; an outer clamp jaw fixedly attached to said support member and extending substantially the width of said sheet of material; an inner clamp jaw extending substantially the width of said outer clamp jaw and slidably mounted in said outer clamp jaw; compression spring means normally pressing said clamp jaws tightly together to hold said end of said sheet of material firmly between the clamping edges of said clamp jaws; means comprising shoulder screws fixedly attached to said inner clamp jaw through said housing for limiting one extreme position of said inner clamp jaw so that said outer clamp jaw can be moved relative to said inner clamp jaw so as to provide an opening between the clamping edges of said clamp jaws to provide space for inserting said end of said sheet of material between said clamping edges.

4. Apparatus for placing and holding paper and like material in a predetermined position suitable for visible recording thereon in such manner as to prevent any movement of said material from such position, comprising: a platen having a surface thereon capable of providing a solid backing for at least a portion of a sheet of material that may be held thereon; at least one mark in the vicinity of each corner of said platen to serve as a guide line for a similar mark on the sheet of material; a sheet of material having marks thereon corresponding at least in part to said marks in the vicinity of the corners of said platen and located such that the respective corresponding portions of said marks can be made to register in the vicinity of each corner when said sheet is correctly positioned and stretched; and a gripping and positioning mechanism adjacent each of a pair of opposite ends of said platen, each said gripping and positioning mechanism comprising means for gripping one end of said sheet of material and for adjustably stretching said sheet and positioning said end in such manner as to place said marks on said sheet of material in registry with said marks in the vicinity of each corner of said platen, said sheet of material comprising paper positioned in said apparatus with the machine direction of said paper substantially parallel to said opposite ends of said platen where said gripping and positioning mechanisms hold said paper, whereby said paper remains substantially free from stress in its machine direction and is stretched by said mechanisms perpendicular to said machine direction.

5. Apparatus for placing and holding paper and like material in a predetermined position suitable for visible recording thereon in such manner as to prevent any movement of said material from such position and any dimensional change in said material that might otherwise result from variations in ambient conditions such as humidity, comprising: a rectangular platen made of a material capable of transmitting light therethrough, having a surface thereon capable of providing a solid backing for at least a portion of a sheet of material that may be held thereon; at least one mark on said surface in the vicinity of each corner of said platen to serve as a guide line for a similar mark on the sheet of material; illuminating means behind said platen providing light of sufficient intensity to penetrate said platen and the sheet of material held thereon so as to make said marks visible through said sheet of material; a sheet of material such as paper capable of transmitting light therethrough, having marks thereon corresponding at least in part to said marks on said platen and located such that the respective corresponding portions of said marks can be made to register in the vicinity of each corner when said sheet is correctly positioned and stretched,

which marks on said sheet of material may comprise portions of recording indicia on said sheet of material; a gripping and positioning mechanism adjacent each of a pair of opposite ends of said platen, each said gripping and positioning mechanism comprising means for gripping one end of said sheet of material and for adjustably stretching said sheet and positioning said end in such manner as to place said marks on said sheet of material in registry with said marks on said platen in the vicinity of each corner thereof and including a stationary member fixedly attached to said platen; a first clamp jaw slidably mounted in said stationary member; a pair of spaced-apart manually adjustable means for positioning said first clamp jaw; a second clamp jaw slidably mounted adjacent said first clamp jaw; yieldable means normally pressing said clamp jaws tightly together to hold said end of said sheet of material firmly between the clamping edges of said clamp jaws; and means for limiting one extreme position of said second clamp jaw to permit movement of said first clamp relative to said second clamp jaw to provide an opening between the clamping edges of said clamp jaws; said sheet of material being stretchable in the direction between the opposite ends wherein it is gripped by said mechanisms; including independently adjustable positioning means in each said mechanism in the vicinity of each extremity of said end of said material gripped by said mechanism.

6. Apparatus for placing and holding paper and like material in a predetermined position suitable for visible recording thereon in such manner as to prevent any movement of said material from such position and any dimensional change in said material that might otherwise result from variations in ambient conditions such as humidity, comprising: a rectangular platen made of a material capable of transmitting light therethrough, having a surface thereon capable of providing a solid backing for at least a portion of a sheet of material that may be held thereon; at least one mark on said surface in the vicinity of each corner of said platen to serve as a guide line for a similar mark on the sheet of material; illuminating means behind said platen providing light of sufficient intensity to penetrate said platen and the sheet of material held thereon so as to make said marks visible through said sheet of material; a sheet of material such as paper capable of transmitting light therethrough, having marks thereon corresponding at least in part to said marks on said platen and located such that the respective corresponding portions of said marks can be made to register in the vicinity of each corner when said sheet is correctly positioned and stretched, which marks on said sheet of material may comprise portions of recording indicia on said sheet of material; a gripping and positioning mechanism adjacent each of a pair of opposite ends of said platen, each said gripping and positioning mechanism comprising means for gripping one end of said sheet of material and for adjustably stretching said sheet and positioning said end in such manner as to place said marks on said sheet of material in registry with said marks on said platen in the vicinity of each corner thereof and including a housing fixedly attached to said platen; a plurality of guide pins fixedly attached to said housing; a support member extending substantially the width of said mechanism; a guide member extending substantially the width of said mechanism, fixedly attached to said support member and slidably mounted on said guide pins; a pair of manually adjustable means mounted on said housing, one in the vicinity of each end thereof, each threadedly connected to said guide member; an outer clamp jaw fixedly attached to said support member and extending substantially the width of said sheet of material; an inner clamp jaw extending substantially the width of said outer clamp jaw and slidably mounted in said outer clamp jaw; compression spring means normally pressing said clamp jaws tightly together to hold said end of said sheet of material

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firmly between the clamping edges of said clamp jaws; means for limiting one extreme position of said inner clamp jaw so that said outer clamp jaw can be moved relative to said inner clamp jaw so as to provide an opening between the clamping edges of said clamp jaws to provide space for inserting said end of said sheet of material between said clamping edges; said sheet of material being stretchable in the direction between the opposite ends wherein it is gripped by said mechanisms; including independently adjustable positioning means in each said mechanism in the vicinity of each extremity of said ends of said material gripped by said mechanism.

7. Apparatus for placing and holding paper and like material in a predetermined position thereon in such manner as to prevent any movement of said material from such position, comprising: means for supporting at least a portion of a sheet of material that may be held on said apparatus; a sheet of material having a plurality of marks thereon substantially spaced apart at least in the direction between a pair of opposite ends thereof; means for defining a predetermined location on said apparatus for each said mark; said predetermined locations on said apparatus being spaced farther apart than said marks on said sheet in the direction between said pair of opposite ends; and a gripping and positioning mechanism adjacent each of a pair of opposite ends of said supporting means, each said gripping and positioning mechanism comprising means for gripping one of said opposite ends of said sheet of material and for adjust-

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ably stretching said sheet and positioning said end in such manner as to place said marks on said sheet of material in their respective predetermined locations as defined by said location defining means, and including a stationary member fixedly attached to said supporting means; a first clamp jaw slidably mounted in said stationary member; a pair of spaced-apart manually adjustable means for positioning said first clamp jaw; a second clamp jaw slidably mounted adjacent said first clamp jaw; yieldable means normally pressing said clamp jaws tightly together to hold said end of said sheet of material firmly between the clamping edges of said clamp jaws; and means for limiting one extreme position of said second clamp jaw to permit movement of said first clamp jaw relative to said second clamp jaw to provide an opening between the clamping edges of said clamp jaws.

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