May 26, 1959 J. Q. HORNE, JR 2,887,941

JUSTIFYING MEANS FOR PRINTERS

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Fig.1

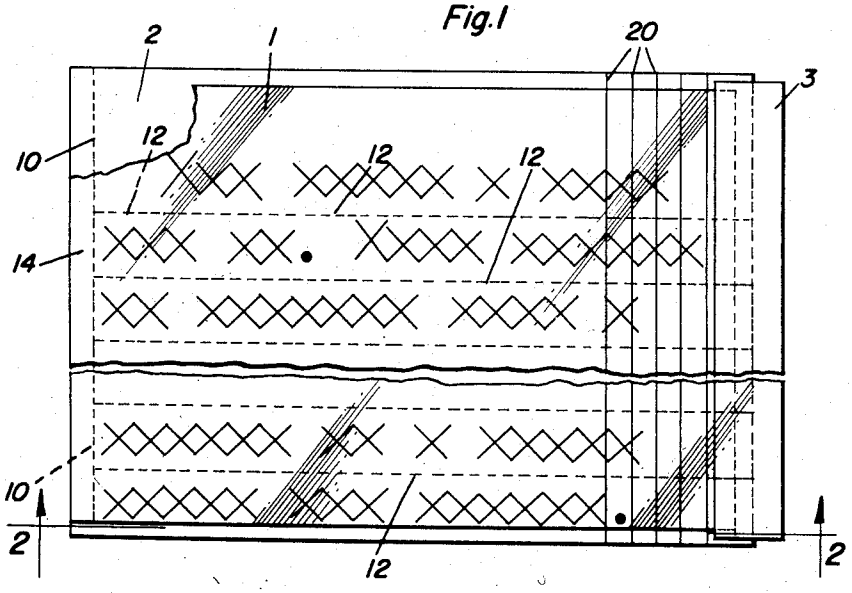


Fig.2

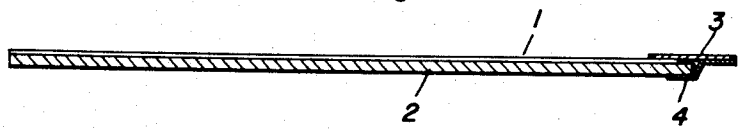
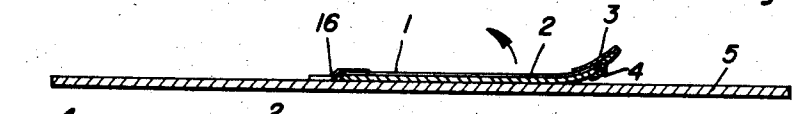


Fig. 3A



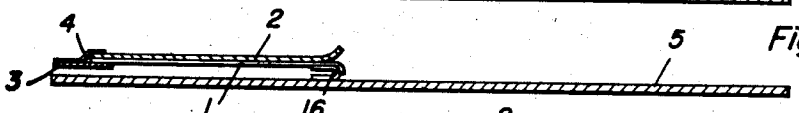


Fig.3B

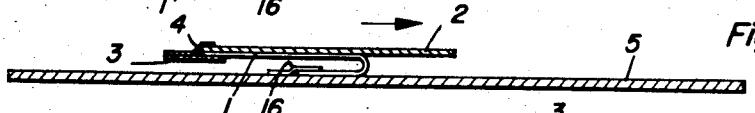


Fig. 3C

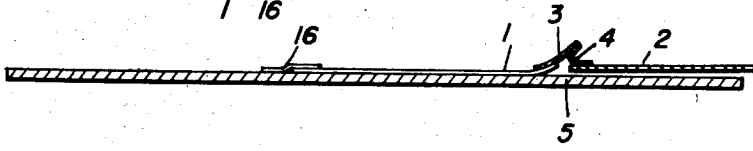


Fig. 3D

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Fig.4

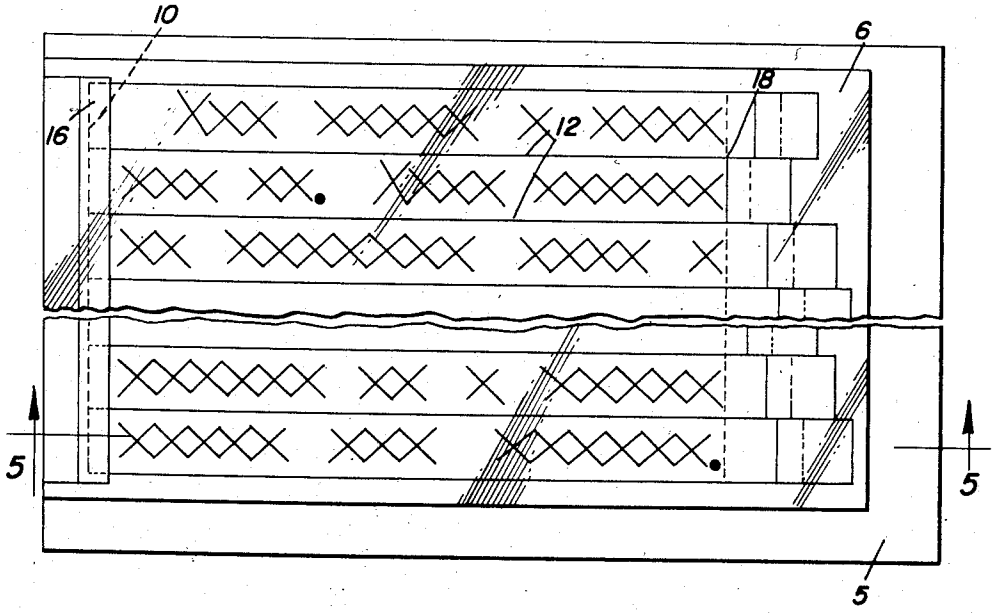
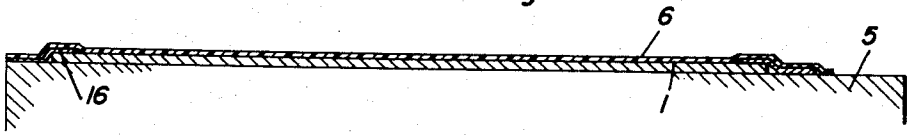


Fig.5



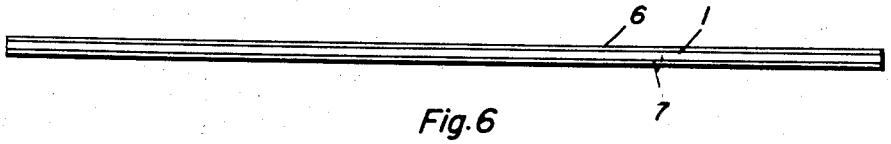


Fig.6

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JUSTIFYING MEANS FOR PRINTERS

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Application September 17, 1952, Serial No. 310,100

9 Claims. (Cl. 95—85)

This invention relates to justifying means in the art of printing and in its broadest aspect is an improvement in the art of reproducing by transfer processes any writing or subject matter composed in lines of typed or impressed letters or characters.

A main object of the invention is to form a composing device or sheet with an elastic or stretchable surface that is adapted for use with typewriters and similar machines and that can have clear impressions of type applied to its stretchable surface in such a way as to be capable of simplifying and improving applications of offset, photographic, lithographic, and other forms of printing by dispensing with preliminary representation or calculation, due to its ability to justify lines of printed type on said elastic or stretchable surface.

This is accomplished by impressing lines of type on a thin elastic or stretchable sheet of material somewhere in the neighborhood of one or two thousandths (.001 or .002) of an inch in thickness stiffened by a backing of nonstretchable material preferably somewhat thicker than the stretchable material. A preferred stretchable material is vinyl sheeting, but rubber or any similar material of the specified thickness may be used. (Such materials are sometimes referred to as "homogeneous" stretchable materials in order to distinguish them from materials having a disjointed surface and a consequent stretching action due to corrugations or "pleats.") The combined sheets of stretchable and nonstretchable material can be impressed on their elastic side with lines of type by a typewriter or similar machine and either the stretchable material or the combined materials may thereafter be cut into strips of material having a line of type on each strip. The backing can then be removed to enable the unbacked strips to be stretched the required amount to form justified lines.

The above-mentioned relative thicknesses of stretchable sheet and nonstretchable backing are critical in order to secure the following advantages:

(1) The device has sufficient body as to be readily manipulated for insertion into a typewriter, "Vari-Typer," or similar machine, while the elastic portion of said device is sufficiently tenuous as to cause no appreciable cushioning of the type impact or consequent blurring of the type image.

(2) The typed lines can be cut easily into strips, either by cutting through the stretchable material before removing the backing, or by cutting through the combined materials. Such an operation would be difficult to perform on the unsupported stretchable material alone.

(3) The vertical alignment of the left-hand margin is easily maintained, since the left-hand edge of the combined materials is left undissevered even when the backing, as well as the stretchable material, is cut between the lines of type. The rigidity of the backing makes it possible to keep this edge straight while the elastic portion of said edge, that is, the left-hand marginal portion of the stretchable vinyl sheet, is being affixed to a supporting surface by means of pressure-sensitive tape.

Subsequent removal of the backing does not affect this alignment.

(4) The rigidity of the backing and the pliability of the elastic material combine to produce a peeling effect which facilitates the removal of said backing.

Two added advantages of employing a stretchable sheet which is relatively thin are the ease with which it can be cut into strips and the small amount of tension required to stretch such strips.

Another object of the invention is to present a justifying means in its completed (i.e. stretched) form that can be handled conveniently in photographic, photo-offset, photo-engraving, and similar operations, and to that end an adhesive transparent sheet is secured to the entire printed surface to the device, and another sheet of material, also adhesively coated, is attached to the back of the device, as hereinafter described.

An additional feature is the securing of an overlapping adhesive strip, such as pressure-sensitive cellophane tape, to the right-hand margin of the stretchable sheets before they are inserted into the typewriter or similar machine and covering the exposed portion of the adhesive substance with a removable member and keeping said substance covered by said member until each line is about to be justified.

A further advantage afforded by the invention lies in the fact that guide lines **20** may be printed on the face of the backing material to assist in typing on the relatively transparent elastic material through which they are visible, said guide lines, however, being eliminated from the finished justifiable copy when the backing is removed. A particularly desirable embodiment of this idea is represented by a plurality of parallel vertical lines near the right-hand margin of the typing area to enable the typist to regulate the length of each line within the limits of a maximum-length line without having to fill out each shorter line with *x*'s or similar symbols as has been the case in other systems of typing-machine justification.

In the accompanying drawings:

Figure 1 is a plan view, parts being broken away, of the justifying means, sometimes termed a composing device and which includes the sheet of stretchable material together with a non stretchable backing sheet connected thereto;

Figure 2 is a vertical transverse sectional view taken substantially upon the plane indicated by the section line **2—2** of Figure 1;

Figs. 3A, 3B, 3C, and 3D are sequential detail views similar to Figure 2, but disclosing the progressive steps in removing the backing;

Fig. 4 is a plan view similar to Fig. 1 but of the justifying means after the lines have been justified and a transparent cover sheet has been applied;

Figure 5 is a vertical transverse sectional view taken substantially upon the line **5—5** of Figure 4; and

Figure 6 is an end elevational view of the complete justified sheet of Figure 4.

Like figures of reference indicate like parts throughout the drawings.

In Fig. 1, the *x*'s represent lines of letters or characters impressed on the stretchable sheet which is marked with the numeral **1**. A backing of inelastic material is marked **2** and underlies the sheet **1**. An overlapping cellophane tape attached to the right-hand edge of the stretchable material is indicated by the numeral **3**, while a removable member covering part of the adhesive on this tape is indicated by the numeral **4** in Fig. 2. The vertical dotted line **10** appearing at the left side of Figure 1 indicates a preferred location outside the left margin of the printed matter for discontinuing the slits shown by the dash lines **12** by which the separate lines of printed

matter are separated. (This assumes that the backing material is cut along with the stretchable material. Where the stretchable material alone is cut, the cutting does not necessarily have to keep within the limits indicated by the arrows, but may extend entirely across the composite sheet. In the description in the next few paragraphs, it is assumed that both materials are being cut.)

Following the entire process through, as illustrated by the drawings, it will be noted that the first step in the justifying process involves the materials identified by the numerals **1**, **2**, **3**, and **4** in Figs. 1 and 2. These materials, the elastic typing surface, the inelastic backing sheet, the strip of pressure-sensitive tape, and the removable member covering said tape, are inserted as a unit into the typing machine. Lines of printed matter, represented by *x*'s in Fig. 1, are then typed onto the elastic surface of said unit, being so positioned that the last letter in a line of the maximum length permitted by the desired format will fall slightly short of the above-mentioned strip of pressure-sensitive tape. The unit is then removed from the typing machine, and any surplus material to the left of the printed matter is cut away, so as to leave a left-hand margin, indicated at **14**, approximately one-half of an inch across. The unit is then cut by the most convenient means at hand approximately along the lines marked **12** in Fig. 1. The cutting process, along with the strips created thereby, does not extend through the left-hand margin of the unit, but ceases a short distance, possibly an eighth of an inch, to the left of the left-hand extremity of the printed lines at the dotted line **10**.

The unit, due to its semi-dissevered condition, may be somewhat unmanageable at this point. This condition can be remedied by turning the unit face down on a flat surface and applying a strip of cellophane tape to the back of the unit in such a way as to reunite the strips into which the unit has been cut, placing the tape near the ends of said strips but being careful not to have it come into contact with the removable member indicated by the numeral **4** in Fig. 2.

The unit is next placed, typed side up, on a smooth surface (Figs. 3 and 4, numeral **5**) suitably provided with visible horizontal guide-lines (not shown) and, if possible, a movable vertical guide-line (not shown). When the typed lines have been carefully lined up with the horizontal guide-lines, a strip of cellophane tape **16** is applied to the narrow left-hand margin of the unit in such a way as to fall a small fraction of an inch short of the beginning of the printed lines. The overlapping portion of the cellophane tape is secured firmly to the supporting surface. The entire unit is then folded back to the left and the backing removed from the stretchable material as indicated in detail in Fig. 3D.

The lines of printed matter are now ready to be justified. This is accomplished by selecting a maximum-length typed line on one of the stretchable strips and establishing a vertical guide-line at its normal, unextended extremity as indicated by the dotted line **18** of Figure 4. The typed line is then secured to the supporting surface in such a way that its last character touches said vertical guide-line **18**. This process is repeated for all the typed lines, except that the shorter lines must be stretched in order to bring them into contact with said vertical guide-line. All of the typed lines are kept straight by aligning them with the previously mentioned but not shown horizontal guide-lines which are visible through the stretchable strips, and said stretchable strips are secured to the supporting surface by separating the removable cover **4** from the portion of pressure-sensitive tape which is still affixed to the end of each strip and applying the newly-exposed adhesive area to said supporting surface.

When all the lines have been justified in this manner, a broad strip or sheet of transparent pressure-sensitive material is applied to the entire printed area, as indicated by the numeral **6** in Fig. 4. This "locks" the type permanently into position, and the transparent sheet and the justified printing are then removed from the supporting surface in the form of a single sheet. This sheet is then turned over and held flat by any convenient means, and a second strip of pressure-sensitive material (numeral 7), not necessarily transparent, and gummed on either one or both sides, is applied to the exposed under side of the justified material. The justified typed matter is now sandwiched between two layers of pressure-sensitive material (see Fig. 5) and forms a durable, flat-lying, background-free "original" which can be photographed with perfect results either as a unit or as part of a "paste-up" of a larger page or display. Under some conditions the shiny surface of the top transparent layer of pressure-sensitive material will show up in a photograph. This effect, if found undesirable, can be completely eliminated by rubbing the surface of the "original" with a little powdered pumice on a soft, dry rag.

The stretchable material of the present invention, in addition to being limited as to thickness and compressibility, must have certain other special characteristics in order to function properly. The most important of these are both physical and chemical in nature and have to do with ink or "carbon" receptivity. Fortunately, normal manufacturing methods afford several ways of varying such characteristics in stretchable films. Thus, while certain materials have particular affinities for certain other materials, these affinities can be regulated not only by the proper proportioning of the materials in question but also by the addition or removal of various other substances. In this connection, rubber and various rubber compounds possess an affinity for certain inks, including typewriter ribbon ink, while vinyl products have an affinity for both ink and carbon "dope." These affinities can be enhanced by the introduction of such substances as curing agents, plasticisers, peptizers, tackifiers, pigments, fillers, and dulling materials—all of which produce changes in the surface as well as the body of the stretchable film and, hence, alter its receptivity to inking materials. And if these measures are not enough, various mechanical means may be employed to carry the effect still further. These include varying the vulcanizing, fusing, calendering, or polymerizing temperatures and using matted or frosted calendering rolls or embossing rolls. Such operations are standing procedure in the art at the present time and are generally sufficient to produce any desired effect. Conceivably, they could, if necessary, be augmented by abrading processes or by the use of coating materials.

As regards the means of affixing the stretchable film to the backing sheet, three general methods of accomplishing this are presently in manufacturing use: coating, direct calendering, and laminating. The proper one of these methods to use in a particular case naturally depends on the exact nature of the stretchable material being handled. In coating (which includes spreading, roller-coating, reverse roller-coating, extruding, etc.), the stretchable material is applied to the backing in unsolidified form and then turned into a solid sheet by such means as evaporation, fusing (thermal or otherwise), or gelation. When the film is calendered directly onto the backing, the original material (which must be capable of thermal fusing or polymerization) is introduced in the form of a dough which is spread upon the backing by hot rollers which fuse it simultaneously. In the case of a laminated film and backing, the former (usually an unsupported calendered film) is nearly always affixed to the latter by means of an adhesive substance. When this last system is used in connection with the present invention, considerable care must be devoted to the selection of an adhesive, since it must combine the quality of being relatively incompressible, so as not to increase the compressibility of the typing surface, with the quality of sticking to the film being used. Other characteristics necessary are flexibility, absence of curling effect on the backing,

and freedom form vaporizing action, so as not to form blisters under the film. Also, the adhesive, in combination with the face of the backing, must form a perfect and continuous contact with the under side of the film, since any surface irregularities are apt to be translated through the stretchable material by the type impact and show up in the final impression. Naturally, these particular problems do not exist in the coating or direct calendering methods, although blistering may occur here too, due to moisture in the backing material. In summation, it may be stated that, whatever the bonding process used, it must be selected and regulated with an eye to giving sufficient support for the film to stand up properly under the type impact, and it must allow the film to be readily stripped.

With respect to the pressure-sensitive tabs 3 of the present invention, it should be noted that they perform a double function. In addition to "sticking" the strips in place, they afford a grasping means whereby pulling force is exerted in a perfectly straight line across the vertical width of the stretchable strips. This results in all parts of the strips being stretched evenly. Consequently, they remain flat throughout the operation. When the strips are stretched without the tabs, they are stretched less near their tops and bottoms than they are in between (due to the curved contour of the operator's fingers). This not only distorts the typed characters badly, but produces longitudinal ridges in the strips which make them extremely difficult to handle.

Concerning the general characteristics of the justifying means described above, it may be said that the most obvious objection to it in theory, the distortion of the typed characters, is much less noticeable than would be expected, being barely discernible in normal column-width format and pratically undetectable in page-width print.

Perfect erasures are possible up until the time the cellophane is applied, since ink or carbon may be completely wiped off the plastic or rubber stretchable surface by means of an ordinary eraser or a cloth moistened with nearly any common solvent. This is an extremely important distinguishing feature as compared with practically any other existing means of preparing offset copy, since it eliminates the necessity of cutting out mistakes and pasting in corrections in their place—a practice necessitated by the surface abrasion which characterises erasures performed on most common typing surfaces. Subsequent application of the adhesive transparent sheet of the present invention also serves to conceal surface irregularities.

Two useful refinements of the invention which should be mentioned here are the use of a pre-cut stretchable sheet affixed to an undissevered backing, to eliminate the manual cutting operation, and the possibility of assembling a unit with the stretchable material under tension, so as to be contractible as well as extensible after removal of the backing.

The chief advantage of the present invention over earlier developments in the art lies in the fact that it provides a technique for using clearly printable and erasable type-receiving material in a system of line-justifying which will work with any typewriter. Previous systems have either called for special typing machines or have employed type-receiving materials of limited utility. In the latter case, an unsupported rubber sheet and a crepe paper sheet backed with "sticky" paper have been used. The first of these appears to have had poor printing, handling, and dissevering qualities. The second—made with pre-cut crepe paper strips corresponding to lines of type—was low on printing quality, hard to justify neatly, and very hard to correct.

The present justifying process, by employing a thin sheet of elastic material on a strippable paper backing, provides a type-receiving medium with sufficient body to be handled easily in a typewriter and sufficient firmness

to take a clear impression. Furthermore, the "body" and "firmness" coact with the relative smoothness of the stretchable material to produce a surface which has perfect erasing qualities.

It seems axiomatic that the three qualities of printability, erasability (or correctability), nad handle-ability must be present to a reasonable degree in any means of typing justification it is to be practical. This has not been the case in the past, and it is made possible in the present system only by the manner in which the component materials of the system are assembled and manipulated. The most important features of the present arrangement are the fact that the stretchable material is joined strippably yet firmly to the backing and that it is transferred from the backing to a solid supporting surface for the stretching operation.

The importance of the transferring operation in the present process will become evident if one considers what would happen if the thin stretchable material of this process were substituted for the crepe paper used in the crepe paper justifying method previously referred to. The much greater resiliency of the elastic stretchable material as compared to crepe paper would call for stronger, and probably thicker, pressure-sensitive adhesive. This would cause the typed line-strips to stick to the backing with added tenacity wherever they were struck by the type bars, thereby rendering the line-stretching operation much more difficult. Further, the adhesive would cushion the impact of the type on the elastic material. This would produce a fuzzy impression since the elastic—by not affording the rubbing effect caused when the corrugations in crepe paper are flattened out—requires a sharper blow to produce a good printed character. In addition to these drawbacks, the high resiliency of the elastic material would cause the finished type-sheet to curl up just as quickly as the line-strips were stretched and reattached to the backing. This would make the completed unit extremely difficult to handle. Any attempt to overcome these shortcomings by reducing the resiliency of the elastic material would be complicated by the fact that a too-great reduction in thickness can cause the elastic material to tear under the type impact while an increase in plasticising ingredients can both weaken the material and destroy its erasability.

A careful study of these considerations will lead to the conclusion that the simplest, if not the only, way of getting clear typed impressions onto an erasable stretchable material and of stretching the material for justifying is to attach a thin sheet of this material temporarily to a paper-like backing using a relatively "hard" (or non-cushioning) adhesive, typing on it, and then transferring it to a solid supporting device where the stretchable material, cut into "line-strips," may be stretched and justified and held in that condition until photographed or otherwise disposed of. This procedure has the added advantage of permitting the line-strips to be stretched in a sliding manner when they are resting on an adhesive-free supporting surface. Such an arrangement appears to be particularly well-suited for use with mechanized, as well as purely manual, strip-pulling means.

The perfect erasures of the present invention are the basis of its greatest utility, aside from justifying, since they not only simplify the normal "typesetting" variety of work but also make it possible to do original composition on the justifying medium in cases where time and labor are in short supply. Thus, a mediocre typist—like many newspapermen—can, with normal care and making numerous changes, produce perfect original copy which may be converted automatically into printed material. This procedure saves not one, but two, "typings" over most previous systems and provides the first practical means (and probably the first means ever suggested) of going from thought to print in a single operation.

This technique, which is a logical extension of the practice in some publications of having the reporter or rewrite

man type his original story in preliminary column form, is actually easier than typing on ordinary paper. It also appears to be the fastest way ever devised of getting into print. Its value in certain journalistic operations should be self-evident.

The ability of the present process to make these advantages possible is explained by its compatibility with the mechanics of original composition. These center about the psychological fact that it is impossible to be completely coherent in writing anything of any length for the first time. Certain changes are always necessary, although the extent to which this is true varies in different kinds of work. In most reportorial writing alterations are usually at a minimum, but it is still essential to be able to go back at least two or three lines at any time to make changes—particularly when writing in a narrow column. This can be done with the utmost ease on the type-receiving medium of the present invention. At least four or five erasures can be made on a single spot without any trace of them being discernible in subsequent photoreproductions.

The invention is not to be limited to the particular constructions shown, as changes may be made without departing from the main principles of the invention and without sacrificing any of its advantages.

What I do claim as my invention for which I desire to secure Letters Patent is as follows:

1. A justifying means comprising a thin stretchable member impressed with clear lines of type and being cut into strips and stretched for justifying lines in combination with sheets of pressure-sensitive material, one of them at least being transparent, secured to both sides of said stretchable member in order to maintain said strips in their justified condition, said pressure-sensitive sheets overcoming by their joint action any tendency of the combined materials to curl up or shrink as would be the case if only one sheet of pressure-sensitive material were used.

2. The method of producing clear justified printed matter comprising impressing characters on a tenuous stretchable material firmly but strippably bonded to an unstretchable backing material, affixing an overhanging strip of pressure-sensitive tape to the right-hand edge of the sheet of stretchable material, covering the exposed sticky portion of the tape with a peelable cover, removing and discarding the backing material, cutting the stretchable material into strips corresponding to lines of type and cutting the tape and the cover at the same time so as to form tabs at the ends of the strips, removing the pieces of cover from the tabs, stretching the strips the amounts necessary to equalize the lengths of the typed or printed lines using the tabs to stretch the strips evenly, attaching the strips by their extremities to a supporting surface using the tabs to secure the right-hand ends of the strips, and photographing the strips while still in a stretched or justified condition.

3. The method of producing justified lines of type comprising typing lines of characters onto a composite sheet having a front surface constituted by a thin transparent basically non-fibrous stretchable sheet loosely bonded to an inelastic backing sheet, applying a strip of pressure-sensitive tape along the right edge of the stretchable sheet and overhanging that edge, covering the exposed overhanging pressure-sensitive area with a peelable guard-strip, cutting the entire assembly between the lines of typing with a cut extending from the right edge toward the left edge and ending slightly past the start of the typed lines, affixing the composite typed sheet to a base by applying a strip of pressure-sensitive tape along the left edge of the composite sheet and overhanging same to make contact with the base surface, folding the composite sheet up and back about its left edge as a hinge line, grasping that edge of the backing sheet and pulling to the right sufficiently to remove the backing sheet entirely and draw the flexible sheet back to its original position but lying directly on the base surface, and line-by-line removing the section of peelable guard, stretching the strip of flexible material to bring the line of characters to a uniform right margin and affixing it there by pressing the section of pressure-sensitive tape onto the base surface.

4. The method of producing justified lines of type comprising typing lines of characters onto a composite sheet having a front surface constituted by a thin basically non-fibrous stretchable sheet loosely bonded to an unstretchable backing sheet, applying a strip of inelastic tape along the right edge of the stretchable sheet, cutting between the lines of type with a cut which extends through the inelastic tape and ending slightly past the start of the typed lines, affixing the composite typed sheet to a base by applying a strip of pressure-sensitive tape along the left edge of the composite sheet and overhanging same to make contact with the base surface, folding the composite sheet up and back about its left edge as a hinge line, grasping that edge of the backing sheet and pulling to the right in order to strip the backing loose and draw the flexible sheet back to its original position, using the sections of inelastic tape remaining at the ends of the strips of stretchable material to draw the lines of characters evenly to a uniform right margin, and affixing the strips to the base surface in their stretched condition.

5. The method of preserving in justified condition type-bearing strips of stretched elastic material comprising applying sheets of adhesively coated relatively incompressible material to their top and bottom surfaces, one of these sheets at least being transparent.

6. The combination with an elastic justifying typewriter sheet of a discardable non-stretchable backing sheet attached to the under side of the elastic sheet by a relatively hard but easily frangible bonding means so as to serve as a reinforcement for the elastic sheet during the typing operation and to be removed thereafter and a strip of inelastic tape adhesively applied to the top surface of the elastic sheet along one of its edges so as to be cut when the elastic sheet is cut into strips corresponding to lines of type and to serve as an aid in stretching and securing the strips in order to justify the typing impressed upon them.

7. The combination described in claim 6 but having the elastic material and the inelastic tape already cut before the typing operation, in effect constituting groups of parallel stretchable strips with inelastic tabs at one end attached to a common undissevered backing sheet so that the strips, when typed, may be made ready for stretching and securing merely by removing the backing sheet.

8. A typewriter sheet for justifying printed matter comprising a sheet of transparent, resilient and stretchable material having a flat, smooth and erasable surface substantially non-deformable and incompressible for receiving thereon clear lines of type without appreciable alteration of said surface, a stiffening sheet of unslitted, substantially non-stretchable backing material removably secured to substantially the entire area of the back of said transparent sheet, said transparent sheet being precut by having transversely extending slits whose opposite ends terminate adjacent the left and right edges thereof whereby to provide strips each for receiving a line of printed matter separated by said slits, the unslitted stiffening sheet retaining the strips of the transparent sheet in fixed relation to each other, the arrangement being such that when the backing sheet is stripped from the transparent sheet the right ends of the strips may be individually stretched and all of the printed matter thereon will be uniformly expanded in the direction of the strips to justify the lines of printed matter.

9. A typewriter sheet for justifying printed matter comprising a sheet of resilient and stretchable material having a flat, smooth and erasable surface substantially non-deformable and incompressible for receiving thereon

clear lines of type without appreciable alteration of said surface, a stiffening sheet of unslitted, substantially non-stretchable backing material removably secured to substantially the entire area of the back of said resilient sheet, said resilient sheet being precut by having transversely extending slits whose opposite ends terminate adjacent the left and right edges thereof whereby to provide strips each for receiving a line of printed matter separated by said slits, the unslitted stiffening sheet retaining the strips of the resilient sheet in fixed relation to each other, the arrangement being such that when the backing sheet is stripped from the resilient sheet the right ends of the strips may be individually stretched and

all of the printed matter thereon will be uniformly expanded in the direction of the strips to justify the lines of printed matter.

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