

June 1, 1943.

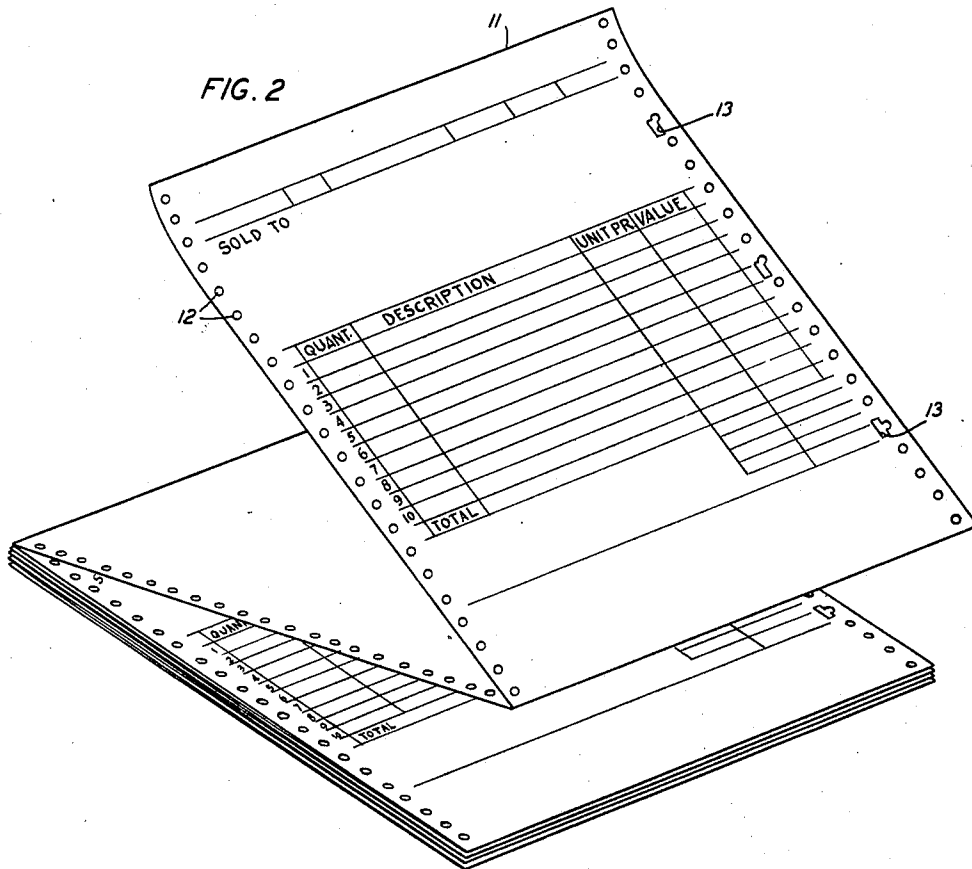
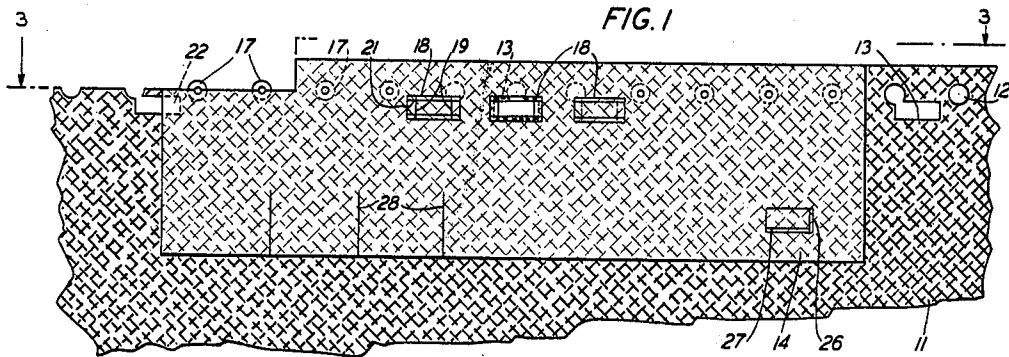
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2,320,938

GAUGE

Filed May 31, 1941

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 3

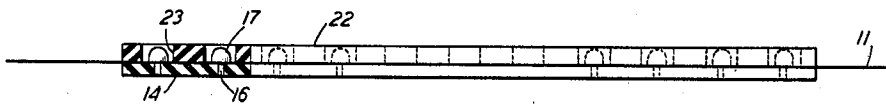


FIG. 4

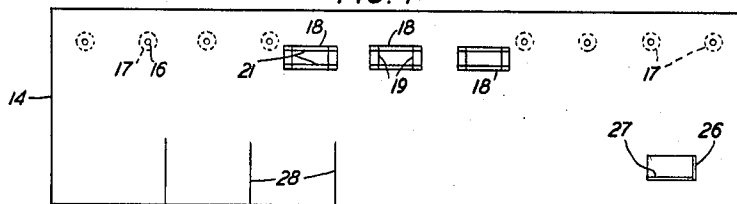


FIG. 5

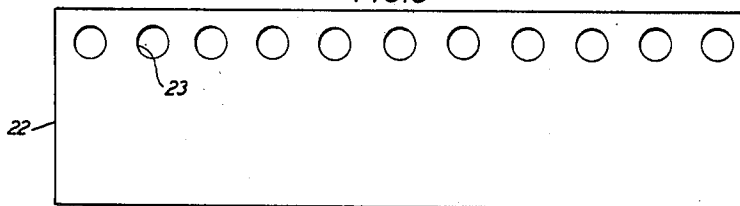


FIG. 6

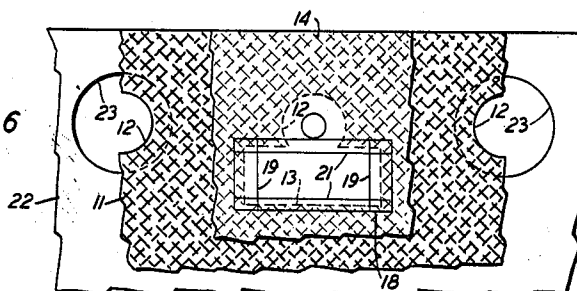
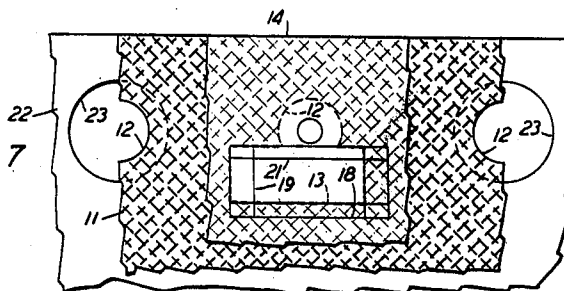


FIG. 7



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GAUGE

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7 Claims. (Cl. 33—174)

This invention relates to measuring instruments and particularly to industrial inspection gauges of a type which may be identified as a comparator gauge.

In connection with the use of continuous form stationery, such as business forms severably interconnected in continuous lengths and having marginal sprocket feed perforations, in type printing business machines, such as page printing telegraph receivers, it has been proposed to provide for the rapid advancement of continuous form stationery from one line printing position to another, such as by continuous or rapidly repeated line feeding operation. In accordance with one embodiment of such apparatus, it has been proposed to provide in the stationery, in accurately determined positions with respect to predetermined line printing points in the stationery, special perforations to be entered by a seeker or sensing instrumentality when the special perforation comes into registry with the sensing instrumentality. Upon entering one of the special perforations in the stationery, the sensing instrumentality operates to arrest the page feeding mechanism, thereby arresting the stationery in a position to receive printed message material at a predetermined line position thereon.

In certain well-known types of printing telegraph apparatus the line spacing of printed message material is six lines to the inch and it is necessary that the special perforations for controlling the arrestment of the stationery after rapid feeding operation, shall be dimensioned and positioned in the stationery with considerable accuracy in order that the portion of the page of stationery presented in the printing position shall not be one line space above or below that in which message material should be printed.

The maintenance of the desired accuracy of location and dimension of the special perforations necessitates inspection of finished forms by the manufacturer and supplier of the stationery and similar inspection of at least randomly selected ones of the forms by purchasers of supplies of such stationery. The inspection of the perforations by actual measurement using ordinary geometrical instruments is a tedious, time consuming, and therefore relatively expensive operation.

Accordingly, it is an object of this invention to provide an inspection gauge by means of which the degree of conformity of any special perforation with a standard of comparison may be quickly observed visually.

The invention features means for quickly and accurately positioning the gauge with respect to a special perforation to be inspected.

The invention also features means for causing the outline of the special perforations to stand out in sharp contrast to the body of the stationery.

For a complete understanding of the invention reference may be had to the following detailed description to be interpreted in the light of the accompanying drawings in which:

Fig. 1 is a plan view showing a comparator gauge in accordance with the preferred embodiment of the invention positioned with respect to a specimen of stationery for the inspection of a special perforation therein;

Fig. 2 is a perspective view of a specimen of continuous form stationery;

Fig. 3 is an elevational view, partly in section, taken on the line 3—3 of Fig. 1;

Fig. 4 is a plan view of the comparator gauge alone;

Fig. 5 is a plan view of a supporting plate or counter for the comparator gauge; and

Figs. 6 and 7 are fragmentary plan views, partly broken away, showing two different acceptable locations of a special perforation with respect to a standard of comparison carried by the gauge.

Referring now to the drawings and particularly to Fig. 2, the reference numeral 11 indicates a specimen of continuous form stationery, successive forms being integral but separable along transverse severance lines on which successive forms are folded in zigzag form to provide a supply of stationery in the form of a stack. It will be understood that the supply of stationery could be in the form of a roll instead of in a stack of zigzag folded forms. Each form may have suitable rulings thereon to provide appropriate places for various types of message material, such as the name and address of a purchaser or consignee, lines for quantity, description and price information as to merchandise, a line for a total of the several aggregates of price items and lines for any other special information that may be pertinent to particular transactions.

The forms 11 are provided with marginal perforations 12 of uniform size and spacing for cooperation with sprocket feed pins carried by the cylindrical platen of a type printing business machine and, particularly, of a page printing telegraph recorder. The feeding of continuous form stationery by means of sprocket feed mechanism is disclosed in Patent 1,983,586 granted December 11, 1934 to E. F. Watson et al.

It will be apparent that in the form 11 there

are several line printing positions at which predetermined types of message material are to be printed on every form. For example, immediately above the legend "Sold to" is a line printing space divided into sections to receive in printed form certain kinds of information, such as a date, order numbers, salesman's number, etc. Since any such form upon which message material is to be printed will receive at least one item in the body of the form under the heading Quantity, Description, etc., each form, in the course of receiving printed message material will have its line numbered "1" brought into the printing position. Finally, every form will receive printed message material in the line identified "Total."

In order to effect the rapid advancement of a business form from one printing line position to another, the cessation of a multiple line feeding operation of the printer and the arrestment of a form at several successive points in which the first line of a series of lines of message material is to be printed, the page form 11 is provided with a plurality of special perforations 13 closely associated with the right-hand row of sprocket feed perforations 12. In the type of stationery shown in Fig. 2 each of the special perforations 13, which is rectangular in contour, partially merges with a feed perforation 12. The upper and middle ones of the perforations 13 are identically positioned with respect to the feed perforations 12 with which they merge and have their upper edges substantially on a radius of the sprocket feed perforation extending transversely of the paper. The lowermost special perforation 13 differs in relation to the sprocket feed perforation 12 with which it merges from the other two special perforations shown, in that a radius of the feed perforation extending transversely of the page would substantially bisect the rectangular special perforation. A third possible location of a special perforation, which is within the contemplation of the invention but is not shown in Fig. 2, is a perforation which has its lower edge substantially on a radius of its associated sprocket feed perforation extending transversely of the page.

The uppermost of the special perforations 13 is so positioned longitudinally of the page as to accommodate a sensing instrumentality contained in the printing telegraph receiver and arranged to terminate a multiple line feeding operation of the printer with the space immediately above the legend "Sold to" in position to receive appropriate printed message material, and by means of ordinary line feed operation of the printer, the name of the consignee or purchaser and address information may be printed directly below the legend "Sold to." The second of the special perforations 13 is disposed longitudinally of the form 11 in position to arrest the multiple line feeding operation of the printer when the line "1" is in print receiving position. Additional items may be recorded in the additional numbered lines by ordinary line feed operation of the printer. The last of the three special perforations is positioned to bring the line entitled "Total" into printing position. It will be understood that following the typing of the desired information in the line entitled "Total" if the multiple line feeding mechanism of the printer is set in operation the forms will be advanced until the uppermost special perforation in the next form arrests the advancement of the forms in the position for the printing of information in the space above the legend "Sold to."

The position of a special perforation 13 with

respect to the sprocket feed perforation 12 with which it merges determines the distance from the sprocket feed perforation at which a line of message material will be printed on the page. As previously stated, the middle special perforation on the page 11 effects arrestment of the page to present the line numbered "1" in printing position. If the middle special perforation had been centered with respect to the sprocket feed perforation, which arrangement is exemplified by the lowermost special perforation, it would cause the page to be arrested one line feed position above the line numbered "1" which, in a printer providing line feed steps of one-sixth of an inch, would be one-sixth inch above line "1." If the middle special perforation had been disposed with its lower edge substantially coinciding with a radius of the sprocket feed perforation extending transversely of the page, it would cause the arrestment of the page in position to print a line two line feed steps above the line "1" or one-third of an inch above that line. Normally, the sprocket feed perforations 12 are on one-half inch centers, and since the three possible positions of a special perforation with respect to a sprocket feed perforation determine three printing line positions spaced at intervals of one-sixth inch and therefore representing an aggregate of one-half inch longitudinally of the page, it follows that the three possible positions of the special perforations determine printing line positions occupying the space longitudinally of the page equal to the spacing between sprocket feed perforations and that any line printing position on the page may be selected by properly disposing a special perforation in one of the three possible positions with respect to a particular sprocket feed perforation.

Under certain circumstances, the line feed mechanism of printing telegraph receivers is adjusted to provide double line feed whereby any two adjacent lines are spaced on one-third inch centers. Under these conditions the three possible positions of a special perforation with respect to a sprocket feed perforation will determine three printing line positions occupying a space of one inch longitudinally of the page.

Referring now to Figs. 1, 3 and 4, the principal element of the gauge device for checking the dimensions and locations of the special perforations 13 is a flat rectangular plate 14 of colorless transparent sheet material which may be of glass but is preferably a so-called plastic such as that commercially available under the trade-name "Lucite."

Adjacent to one edge the rectangular plate 14 has a row of holes on centers corresponding to the centers of the sprocket feed holes 12 in the stationery 11. The holes in the plate 14 receive and retain, either by threaded engagement or by pressed fit, the shanks 16 of pins 17, the bodies of which are similar to sprocket feed pins and are dimensioned to fit snugly into the sprocket feed perforation 12 in a page of stationery 11 for accurately positioning the plate 14 upon a page of stationery to be inspected.

In the middle of the plate 14, three pins 17 and their mounting holes are omitted from the row of pins and the surface of the plate 14 from which the bodies of the pins extend has inscribed thereon, as by thin scratch lines, three rectangles 18 in predetermined relation to the points where the axes of the omitted pins would be disposed, corresponding to the three possible locations of special perforations 13 with refer-

ence to a sprocket feed perforation 12. The left-hand rectangle 18 has its right-hand end adjacent to the point where the axis of a pin would be if provided, the middle rectangle 18 is symmetrically disposed with respect to the point where the axis of a pin would be, and the right-hand rectangle has its left-hand end adjacent to the point where the axis of a pin would be. Each of the rectangles 18 has a line 19 extending transversely near each end thereof at a distance from the opposite end of the rectangle equal to the length of a perfect one of the special perforations 13. Thus the distance from the right-hand line 19 to the left-hand end of a rectangle 18 or the distance from the left-hand line 19 to the right-hand end of the rectangle 18 is equal to the length of a perfect special perforation. Similarly, each rectangle has a longitudinally extending line 21 adjacent to each side thereof, the distance between one of the lines 21 and the opposite side of the rectangle 18 being equal to the width of a perfect one of the special perforations 13. The distance between one of the lines 19 and the adjacent end of the rectangle 18 represents the distance that a special perforation 13 may vary in position longitudinally of the stationery 11 and still be acceptable. The distance between one of the longitudinally extending lines 21 and the adjacent side of the rectangle 18 represents the distance that a special perforation 13 may vary laterally of the stationery 11 and still be acceptable.

It will be apparent from the foregoing that imaginary transverse lines midway between the lines 19 and their adjacent ends of the rectangle 18 would represent the ends of a perfectly positioned special perforation 13, and the positions of the left-hand and right-hand rectangles 18 may now be described with greater accuracy. The left-hand rectangle is so positioned that an imaginary line between its right-hand end and the right-hand line 19 would pass through the point at which the axis of a pin 17 would be located. Similarly, the right-hand rectangle 18 would be so positioned that an imaginary line midway between its left-hand end and the left-hand line 19 would pass through the axis of a pin 17 if such a pin were provided. The location of the middle rectangle 18 with respect to the axis of an omitted pin 17 was previously identified accurately.

For cooperation with the gauge plate 14 there is provided a supporting plate or counter 22 preferably of opaque plastic material. The counter plate 22 is provided with a row of holes 23 on centers corresponding to the centers of the pins 17 and the holes 23 are preferably substantially larger than the bodies of the pins 17 so that the plate 14 may be placed on top of the counter 22 with the pins 17 extending down into the holes 23 of the counter 22 quickly and easily without the necessity for carefully aligning the pins 17 with the holes 23. Preferably, the counter plate 22 is thicker than the length of the bodies of pins 17 so that the counter plate 22 may be laid flat on a desk or table and the gauge plate 14 may be laid flat on the counter plate 22 with pins 17 extending into the holes 23 in the counter plate 22 but not touching the surface of the desk or table, thereby permitting the gauge plate 14 to have surface engagement with the counter plate 22 over their entire areas. When the gauge plate 14 is thus positioned on the counter plate 22, the inscribed rectangles 18 and lines 19 and 21 are on the lower surface of the

gauge plate 14 and may be observed through the plate since it is transparent and colorless.

When a special perforation in a specimen of stationery 13 is to be inspected, the stationery is placed against the underside of the gauge plate 14 with the special perforation in registration with that one of the three rectangles 18 which corresponds to the position of the special perforation relative to a sprocket feed perforation 12, and the pins 17 are fitted into the sprocket feed perforations 12 in the stationery. This definitely and fixedly locates the particular inspection rectangle 18 with respect to the special perforation to be inspected and obviates all possibility of movement of the stationery with respect to the gauge plate. Thereupon the gauge plate 14 with the stationery 13 mounted on the pins 17 is placed flat upon the counter plate 22 with the pins 17 extending into the holes 23 in the counter plate so that the stationery 11 is confined between the gauge plate 14 and the counter plate 22. This assembly of the gauge parts and the stationery to be inspected is shown in plan view in Fig. 1 and in elevational view in Fig. 3.

The parts having been positioned as described in the foregoing paragraph, the outline of the special perforation may be observed in relation to the particular inscribed rectangle and lines 19 and 21 of the gauge plate. Preferably, the counter plate 22 is of a color which will contrast sharply with the color of the stationery being inspected so that the outline of the special perforation will stand out clearly in relation to the rectangle 18 and the lines 19 and 21. As is well known, business stationery is available commercially in a wide range of colors, one of the purposes for the range of colors being to render readily distinguishable one type of business form from another when a number of different types of forms are used in one office. In view of the fact that it may be necessary to use the gauge plate 14 and a counter 22 in combination with stationery of different colors, it is within the contemplation of this invention to provide opaque counters 22 of a number of different colors so that for any stationery that may be inspected, a counter may be chosen which will set off the area of the counter exposed by the special perforation under inspection in sharp contrast to the body of the stationery. In Fig. 1 and also in Figs. 6 and 7 the stationery 11 has been partially lined in the conventional manner for representing the color orange, to indicate that the stationery is of a different color than the counter which is seen through the special perforation 13 that is being inspected.

In Figs. 1, 6 and 7 the special perforation that has been shown for purposes of illustration in registration with a rectangle 18 to be inspected is of the type shown near the bottom of the stationery 11 in Fig. 2 and is of the type which, when perfectly dimensioned and positioned, is bisected by a radial line of the associated sprocket feed perforation extending transversely of the page. Fig. 6 is an enlarged fragmentary view of the portion of the assembly which is involved in the inspection of the particular special perforation and the outline of the special perforation is shown by dotted lines. The outline shown in Fig. 6 is that of a perfect special perforation in which the ends of the perforation are midway between the ends of the rectangle 18 and their adjacent lines 19 and the sides of the perforation are midway between the sides of the rectangle 18 and their adjacent lines 21.

Permissible variation of the position of the special perforations 13 on the stationary specimen 11 is restricted to having the special perforations 13 appear wholly within the rectangle 18. Fig. 7 shows one of the limit positions of a special perforation 13, in which the left-hand end of the special perforation coincides with the left-hand end of rectangle 18, the right-hand end of the special perforation coincides with the right-hand line 19, the outer edge of the special perforation coincides with the upper side of the rectangle 18 and the inner edge of the perforation coincides with the lower one of the lines 21. If any portion of the special perforation 13 appears outside the rectangle 18 the special perforation does not come within the limit of acceptability and is subject to rejection.

As the positions of special perforations 13 vary with respect to rectangle 18, the manner in which its ends divide the spaces between the ends of rectangle 18 and the lines 19 and the manner in which the sides of the perforations divide the spaces between the side of rectangle 18 and the lines 21 vary. However, as the positions of special perforations of the proper length and width vary, their ends, if not coinciding with one of the ends of rectangle 18 and one of the lines 19, will divide the spaces between the ends of rectangle 18 and the lines 19 correspondingly and the sides of the special perforation, if not coinciding with one of the sides of rectangle 18 and with one of the lines 21, will divide the spaces between the sides of rectangle 18 and the line 21 correspondingly. This affords a convenient means for observing visually whether or not the special perforations are of acceptable length and width. If a special perforation 13 is significantly too long or too short, its ends will appreciably divide the spaces between the ends of rectangle 18 and lines 19 dissimilarly. If one end of a special perforation coincides with one end of rectangle 18, the other end will fall within the space between the other end of the rectangle and the line 19, if the perforation is too long, or will fall within the space between the lines 19 if the perforation is too short. In the same way, the sides of an acceptable special perforation 13 should divide the spaces between the sides of the rectangles 18 and the line 21 similarly unless one of the sides of the special perforation 13 coincides with one of the sides of rectangle 18 in which case the other side of the perforation should coincide with the line 21 adjacent to the other side of the rectangle. If the sides of the perforation fail to divide the spaces similarly or to coincide with one side of the rectangle and one of the lines 21 by a visually appreciable amount, the perforation fails to comply with an acceptable standard and the specimen of stationery which contains the perforation should be rejected.

Near the lower right-hand corner of gauge plate 14 there is inscribed on the same surface thereof as the rectangles 18 a large rectangle 26 which encloses a small rectangle 27 one end and one side of which coincide with one end and one side of rectangle 26. This combination of rectangles serves as a comparator for closely gauging a special perforation 13 as to size. The large rectangle 26 represents the maximum permissible size of a special perforation, and the small rectangle 27 represents the minimum size of a special perforation. A special perforation 13 is gauged for size independently of the rectangles 18 by placing the portion of a specimen of sta-

tionery which contains the rectangle to be gauged between gauge plate 14 and counter plate 22 so that one side and one end of the perforation to be inspected registers with the common side and end of the two rectangles 26 and 27. For a perforation having perfect dimensions, the other side and end should be found to be disposed between the spaced separated sides of the rectangles 26 and 27 and between the spaced ends of those rectangles. A perforation is acceptable if its area is not larger than that of the large rectangle 26 and is not smaller than that of the small rectangle 27. The combination of rectangles 26 and 27 augments the rectangles 18 and enables an accurate visual determination of the acceptability of a special perforation in those instances in which it may be somewhat difficult to determine whether the ends of the perforations divide the spaces between the ends of a rectangle 18 and the lines 19 correspondingly and whether the sides divide the spaces between the side of a rectangle 18 and the line 21 correspondingly.

The gauge plate 14 also has inscribed on the lower surface thereof three parallel lines 28. These lines represent the printing line position corresponding to each of the three rectangles 18. When a special perforation 13 is placed in registry with one of the three rectangles 18, the corresponding one of the lines 28 will indicate the point on the specimen of stationery which will be presented in printing position under the multiple line feed arrestment control of the particular special perforation 13. Since, as previously stated, the spacing of pins 17 corresponds to that of the sprocket feed perforations 12 and the pins are therefore on one-half inch centers, and since the three possible locations of the special perforations with respect to a single sprocket feed perforation represent printing line differences of one line feed or one-sixth inch, the spacing of printing line positions represented by the three rectangles 18 on the gauge plate 14, they being associated with successive sprocket feed perforation positions, is one-half inch plus one-sixth inch, the total of which is two-thirds inch and this is the spacing between adjacent ones of the line 28. Thus the lines 28 permit observation of whether or not a special perforation 13 under inspection is associated with the proper sprocket feed perforation.

Although a specific embodiment of the invention has been shown in the drawings and described in the accompanying specification, it will be understood that the invention is not limited to such specific embodiment but is capable of modification and rearrangement without departing from the spirit of the invention and within the scope of the appended claims.

What is claimed is:

1. A gauge for inspecting perforations in stationery which comprises a transparent plate, means carried by said plate adapted to penetrate perforations in said stationery other than a perforation to be inspected for locating said plate with one surface in engagement with a surface of the stationery, means inscribed in geometric outline form on said plate to be observed in superposed relation to a perforation under inspection for displaying visually the state of conformity of said perforations to predetermined tolerance limits, and a backing plate for supporting at least a portion of the stationery to be inspected, said backing plate having clearance aper-

tures for loosely accommodating said penetrative locating means.

2. A gauge for inspecting perforations in stationery which comprises a colorless transparent plate, means carried by said plate adapted to penetrate perforations in said stationery other than a perforation to be inspected for locating said plate with one surface in engagement with a surface of the stationery to be inspected, means inscribed on said plate to be observed in superposed relation to a perforation under inspection for displaying visually the state of conformity of said perforation to predetermined tolerance limits, and a backing plate for at least a portion of a sheet of said stationery of a color sharply contrasting with the color of said stationery for rendering conspicuous the portion of the surface of said backing plate exposed by said perforation, said backing plate having oversized apertures for readily accommodating said penetrative locating means.

3. A gauge for inspecting perforations in stationery which comprises a transparent plate, means carried by said plate for locating said plate with one surface thereof in engagement with a surface of the stationery containing the perforation to be inspected, a rectangle inscribed on said surface of the plate of a length and width greater than the preferred length and width of a perforation in said stationery, a line inscribed transversely of said rectangle near each end thereof such that the distance from one of said lines to the opposite end of the rectangle is equal to the preferred length of a perforation, a line inscribed longitudinally of said rectangle inside each side thereof such that the distance from either of said longitudinally extending lines to the opposite side of the rectangle is equal to the preferred width of the perforation, said rectangle and longitudinal and transverse lines when superposed upon a perforation under the control of said locating means serving to display visually the state of conformity of said perforation to predetermined tolerance limits of dimensions and of variation in location of said perforation.

4. A gauge for inspecting substantially rectangular feed controlling perforations in stationery which comprises a transparent plate, means carried by said plate for locating said plate with one surface thereof in engagement with a surface of a portion of a sheet of stationery containing a perforation to be inspected, a rectangle longer than a perfect one of said perforations by the amount that said perforation may vary in position longitudinally thereof, and wider than a perfect perforation by an amount that said perforation may vary in position laterally thereof inscribed on said one surface of said plate, a line inscribed transversely of said rectangle adjacent to each end at a distance from the other end thereof equal to the length of a perfect perforation, a line inscribed longitudinally of said rectangle adjacent to each side at a distance from the other side thereof equal to the width of a perfect perforation, said rectangle and longitudinal and transverse lines adapted to be superposed upon a perforation to be inspected under the control of said locating means for displaying visually the state of conformity of said perforation to predetermined tolerance limits by being entirely within said rectangle, by having the sum of the area of the end zones set off by said transverse lines exposed by said perforation substantially equal to the area of one of said end zones, and by having the sum of the areas in the side

zones set off by said longitudinal lines exposed by said perforation substantially equal to the area of one of said side zones.

5. A gauge for inspecting feed control perforations in stationery having marginal feed perforations which comprises a transparent plate, a plurality of pins spaced and dimensioned in accordance with said marginal perforations secured to said plate and extending outwardly from one face thereof for locating said plate with respect to the stationery to be inspected, means inscribed on said plate to be observed in superposed relation to a feed control perforation under inspection as determined by the cooperation of said pins with said marginal perforations for displaying visually the state of conformity of said feed control perforation to predetermined tolerance limits, and a backing plate for supporting at least a portion of a sheet of stationery to be inspected, said backing plate having portions cut away to receive and loosely accommodate said pins.

6. A gauge for inspecting feed control perforations in stationery having marginal feed perforations which comprises a transparent plate, a plurality of pins spaced and dimensioned to correspond with said marginal perforations carried by said plate and extending outwardly from one surface thereof for locating said plate with respect to the stationery to be inspected, means inscribed on said plate on the surface from which said pins extend to be observed in superposed relation to a feed control perforation as determined by the cooperation of said pins with said marginal perforations for displaying visually the state of conformity of said feed control perforation to predetermined tolerance limits, and a backing plate for supporting at least a portion of a sheet of stationery to be inspected, said backing plate having a plurality of apertures substantially larger than said pins and spaced in accordance with the spacing of said pins for loosely receiving and accommodating said pins whereby said first-mentioned plate and said backing plate may engage opposite surfaces of said stationery.

7. A gauge for inspecting feed control perforations in stationery having marginal feed perforations in which said feed control perforations intersect certain of said marginal perforations in a plurality of predetermined ways, a plurality of pins spaced and dimensioned to correspond to said marginal perforations secured to said plate and extending from one surface thereof for locating said plate with respect to stationery to be inspected, means inscribed on said plate corresponding to each of the possible positions of a feed control perforation relative to a marginal perforation to be observed in superposed relation as determined by the cooperation of said pins with said marginal perforation to a feed control perforation under inspection for displaying visually the state of conformity of said feed control perforation to predetermined tolerance limits, the pins which would overlap portions of said inscribed means in consequence of the intersecting relation of feed control perforations to marginal perforations being omitted, and a backing plate for supporting at least a portion of a body of stationery to be inspected, said backing plate having portions cut away to accommodate locating pins in all possible positions on said first-mentioned plate including the point at which pins were omitted.

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