July 7, 1936. E. T. MOTTRAM 2,046,695

RECORD PROJECTOR

Filed Dec. 26, 1934 2 Sheets-Sheet 1

FIG. 1

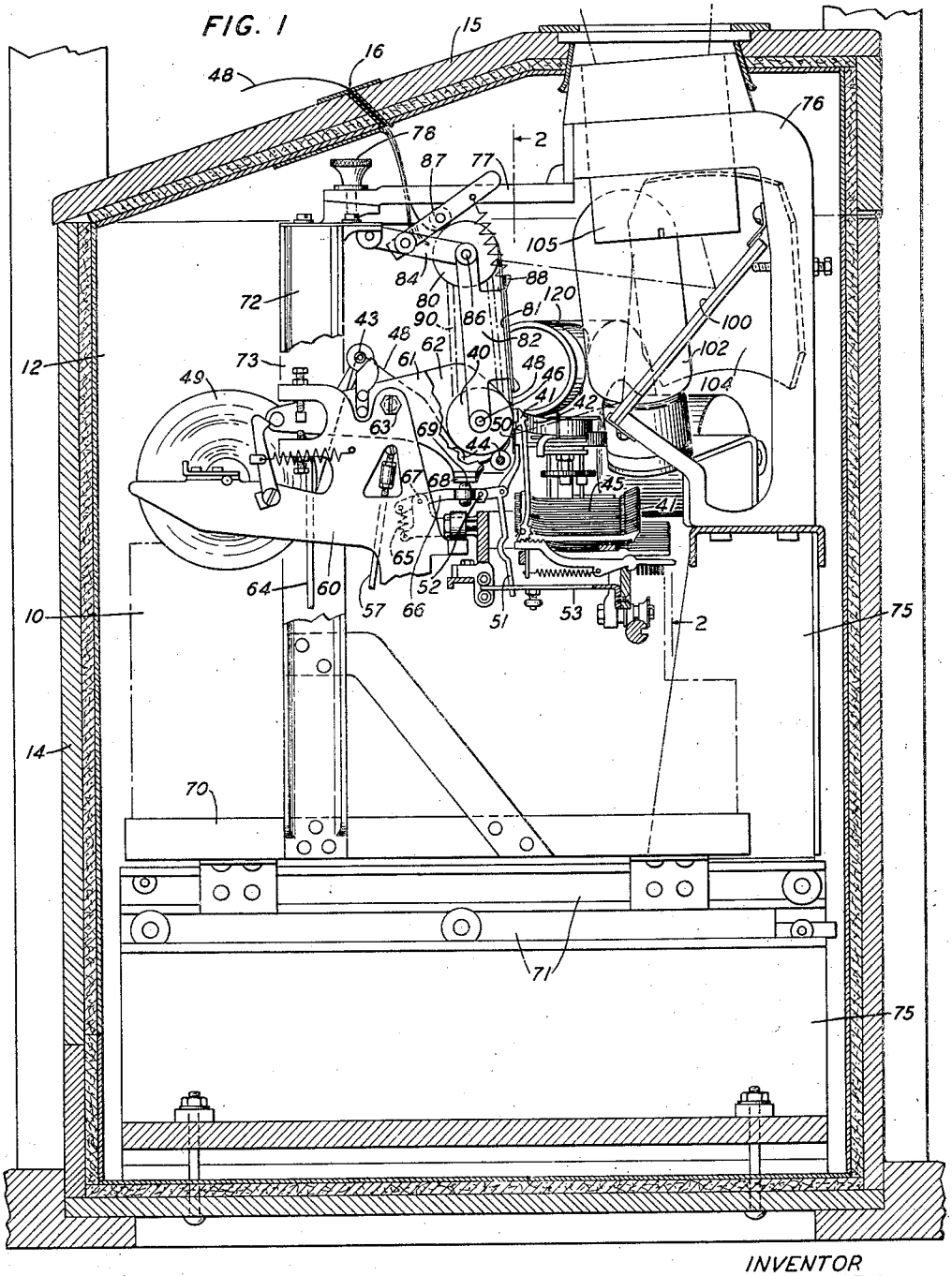

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FIG. 3

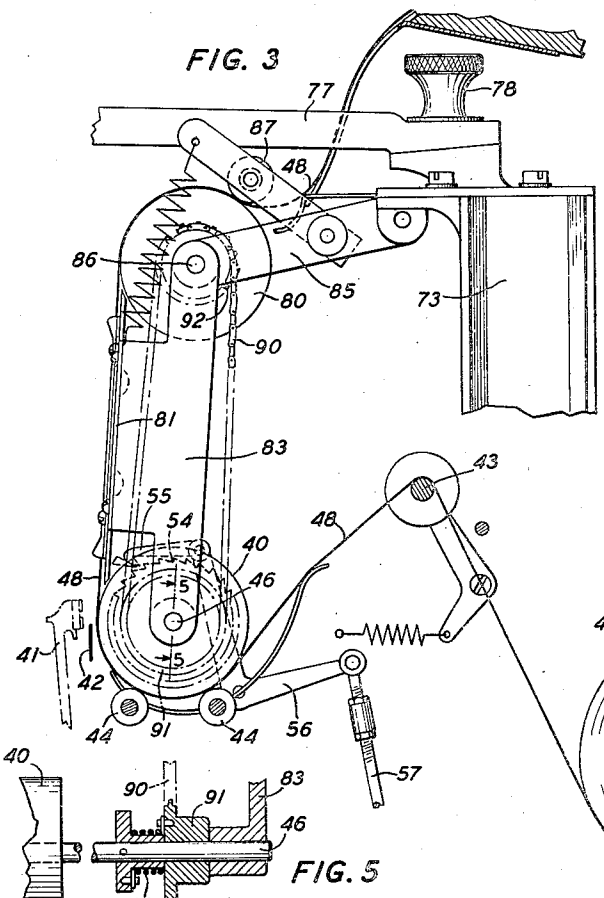
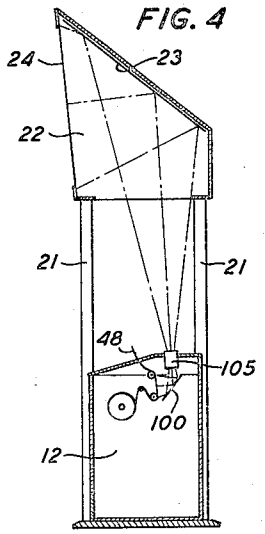


FIG. 4



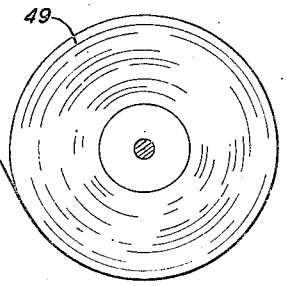


FIG. 5

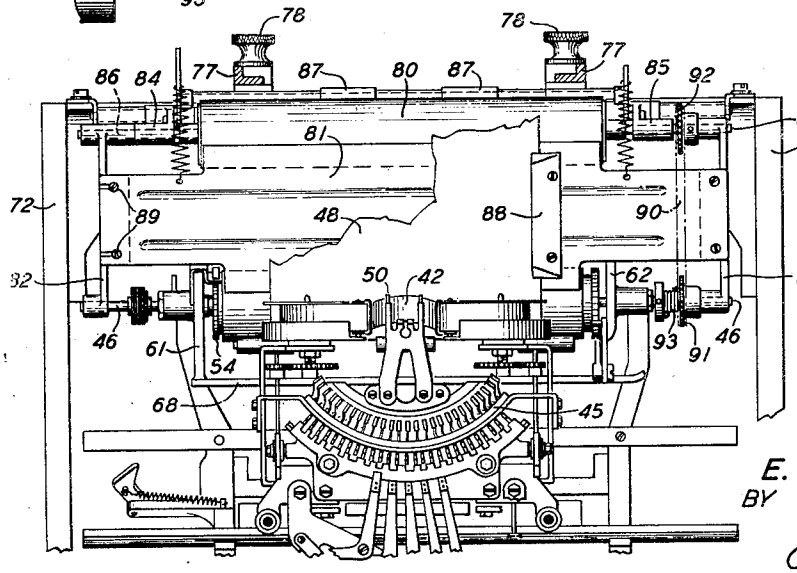


FIG. 2

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RECORD PROJECTOR

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Application December 26, 1934, Serial No. 759,164

6 Claims. (Cl. 88—24)

This invention relates to record projectors and more particularly to devices of this type in which a considerable portion of a recorded message is displayed at any time for observation at a distance.

An object is to provide automatic feeding means for the message record strip operated from the recording device without the need of separate driving means, whereby the record strip may be advanced in stepwise movements.

A further object of the invention is to provide feeding arrangements for the message record strip which will permit the record strip to be moved by a quick step-by-step movement without bulging or side slipping even though a considerable area of the record is exposed for display.

A more specific object is to provide feeding means for the record strip operatively responsive to feeding operations by the recording device whereby the record strip is advanced in a step-by-step movement through an area of exposure without disturbance of focus and without a prolonged disturbance to the displayed image after the completion of the step movement.

In a preferred form of the invention the message display device comprises a recording telegraph printer, of any conventional type and preferably of the page printer type in which the recording paper is advanced by line feed movement of the printer platen. The device further comprises an optical system for viewing a portion of the message recorded upon the recording paper or strip and for projecting it to a display surface some distance from the recorder where the magnified image may be observed by a comparatively large audience.

A feature of the invention, as applied to a device of this type, resides in the provision of guiding means for the recording paper whereby the paper as it leaves the platen is guided through an area which, dependent upon the type of lens system used, may be plane or curved, the guiding means comprising one or more driving rollers parallel with the platen and driven therefrom through yielding driving means and contacting with the recording strip by spring pressed means. During a forward movement of the platen, whereby the recording paper is advanced a definite distance, the guide roller is given a comparatively fast forward movement through the yielding driving means to take up the paper as soon as it is advanced by the platen.

In accordance with a more specific feature of the invention the yielding driving means comprises a motor spring, one end of which is driven by the platen and the other end of which drives the guide or pull roller.

In accordance with a further feature of the invention the motor spring acts between the platen and the pull roller through gearing such that the surface movements of the pull roller during each feed movement is slightly greater than the surface movement of the platen thereby insuring that the recording strip will always be tightened up completely, slippage on the guide roller being secured by proper adjustment of spring pressed means acting to provide friction between the guide roller and the recording strip.

In accordance with a still further feature of the invention the plane area of the recording strip which is exposed to the projector is tangential to the platen and to the guide roller, and the driving means between the platen and guide roller and the mounting means for the guide roller are so arranged, that the exposed area may be "shifted" and "unshifted" without bulging the paper and disturbing the focus.

In accordance with a still more specific feature the spring drive and gearing are supported and mounted only on the platen shaft and on the guide roller shaft, so as to partake with them in the shift and unshift movements, and the guide or pull roller with its spring pressed friction producing means are hinged in a lever system parallel to the shift hinges for the platen in the printer, thus permitting platen, pull roller, driving means, and the exposed plane of the record paper to move as a unit in response to shift and unshift signals.

Further features involved in the invention will appear from the following detail description.

It should be understood that the following description is of a preferred form of the invention which has been found to operate satisfactorily, but that the invention may be modified in many ways without a departure from its principles in the production of operative devices for commercial purposes

Thus the invention is equally applicable to page printers and to tape printers and may be carried out for either of these with certain practical modifications which will be obvious to those skilled in the art. The feeding and guiding means for the recording paper may furthermore be used in accordance with the invention in recording devices arranged for either

stepwise or uniform advance of the paper. Similarly, the optical display system may vary from the preferred form described below, for example, in the omission of mirrors and the direct display of the image by the objective on any plane surface, such as a suitably prepared surface on the wall in the auditorium.

The invention relates to a projecting device such as disclosed in an application for patent Serial No. 759,163 filed December 26, 1934 by Harry Pfannenstiehl on even date with the filing of the present application.

In the following description of the preferred form of the invention reference is made to the accompanying drawings in which

Fig. 1 is a side elevation of one embodiment of the invention and shows mounted in a cabinet, a recording telegraph page printer together with the means for feeding the recording strip and holding it in position for display. Certain parts are shown broken away, for the sake of clearness.

Fig. 2 is a front elevation of the upper portion of the page printer with the feed mechanism shown in Fig. 1. This elevation is taken on the line 2—2 in Fig. 1.

Fig. 3 is a detailed side view of the feeding mechanism showing the path of the recording strip through the message display device.

Fig. 4 is a diagrammatic representation of the optical arrangement within the general structure of the projecting device.

Fig. 5 is a cross-sectional detail view of the yielding drive and is taken on the line 5—5 in Fig. 3.

For a full understanding of the operation of a complete station to which the features of the present invention may be applied, reference should be had to the disclosure in U. S. Patent No. 1,904,164 to S. Morton et al. issued on April 18, 1933, of a telegraph printer of the page printer type suitable for the purposes of this invention. Only such parts of the device shown in that patent are referred to in the following description and shown on the attached drawings as are necessary to facilitate an understanding of the features and operation of the present invention.

Referring to the drawings the projector comprises a general structure having a lower compartment 12 and an upper compartment 22 supported directly above the lower compartment by means of four posts 21. The lower compartment 12 contains the telegraph printer 10 with its recording strip 48, and certain parts of the optical system, namely the viewing mirror 100, the objective lens 105 and the illuminating lamps 102. The upper compartment, which is open at the bottom contains a large mirror 23 and the screen 24 of translucent material for displaying the image of the record on strip 48 before an audience.

The telegraph printer 10 is set on a slidable frame 70 which is placed on a stationary base 75, and it is held rigid with respect to the optical system, i. e., projecting lens, lamps and reflecting mirror, by means of the thumb screws 78 which clamp uprights 72 and 73 of the movable frame 70 to brackets 76 forming part of the stationary base 75, which in turn is suitably mounted in the bottom of compartment 12.

As already stated, the printer 10 is of a type particularly suited for the present purpose in that it has a printing roller or platen 40 which is stationary except for the case shift and line shift motions, both of which can be observed in the image on the screen 24, and in having visible printing which permits the optical system to observe the actual printing of the message as readily as can a typist operating an ordinary typewriter, and which consequently permits the audience to observe the type hammers 41 from the traveling type basket 45 as well as the oscillating color ribbon 42 in the very act of printing.

The printer carries a supply roll 49 of standard opaque paper strip 48 of sufficient width for page printing, and the paper is led over the paper straightening rod 43 and about the platen 40 in the usual manner; pressure rollers 44 serve to press the paper against the platen, so that the paper will be positively fed along every time the platen is turned a step for line feed in response to proper telegraph signals. The paper is then passed behind the color ribbon 42 at the line of printing.

In the printing operation, the color ribbon guide 50 is reciprocated up and down through the medium of a bell crank 51 each time the striker bar 53 operates a type 41.

The platen 40 is journaled in two reciprocable endplates 61, 62 which in turn are hinged at 63 in the main printer frame 60, and are operated through the medium of the rod 64 in response to case shifting signals into shift and unshift positions. A lever 66 is pivoted in a bracket 67 which is mounted to travel with the type basket 45; the lever 66 carries a roller 69 which by means of the spring 65 is held in engagement with a cross-bar 68 connecting the end plates 61 and 62 together, so that lever 66 will follow the shift movements of the platen structure. The ribbon oscillating bell crank 51 is pivoted at 52 on the lever 66 in order that the ribbon shall retain its relation to the platen in both case positions. In this manner it is insured that the printing will be equally visible to the projecting system whether the recording be in the upper or the lower case.

Special guiding means for the paper strip have been attached to the platen structure of the standard telegraph printer 10 in order that the paper may form an area for simultaneous projection and display of several recorded lines, including the line being printed.

The guiding means consist of a backing plate 81, which is mounted rigidly on the brackets 82 and 83 in any suitable manner, and a guide roller 80 pivoted in parallel levers 84, 85 which in turn are hinged to two steel uprights 72 and 73 forming part of the movable frame 70. The lower end of each of the brackets 82 and 83 is pivotally attached to the platen shaft 46 and the upper end is pivotally attached to a shaft 86 which carries the guide roller 80. The guide roller 80 is substantially similar to platen 40 and is mounted for parallel movement with the platen 40 during shifting by means of the arrangement of brackets 82, 83 and levers 84, 85.

The recording strip 48 is fed across the backing plate 81, which is tangential to the platen 40 at the line being printed, for exposure to the optical system of several lines of the message including the line being printed. The recording strip is then passed over the guide roller 80 and under a set of pressure rollers 87, to insure movement of the strip with the roller 80 at line feed, thence upward and through a slot 16 in the lid 15, of compartment 12. In this manner, the exposed area of the record strip which, in a manner yet to be explained, is always kept taut between the platen 40 and the roller 80 is moved up and down substantially in its own plane

during the shifting operations, so that an accurate focus may be maintained in both upper and lower cases.

The guide roller **80** is driven from platen shaft **46** by suitable means such as a chain **90** connected to sprocket wheel **91** on the platen shaft **46** and to the sprocket wheel **92** on shaft **86** of roller **80**. In order to keep the recording strip **48** taut during line shift, the gearing is such that the guide roller **80** turns slightly faster than the platen **40**, and the power is supplied to the guide roller **80** through a helical spring **93**, so that a sudden slack in the paper across the plate **81** at line shift will be taken up instantaneously by the roller **80** and the focus will be retained.

For the purposes of the line-feed operation the platen is driven step-by-step in a well known manner by the ratchet wheel **54** on the platen shaft **46** and the stepping pawl **55** carried by the double lever **56**. The lever **56** is operated in a rocking motion once for each incoming line-feed signal by means of the pull-rod **57** from the main cam shaft in the printer. This rocking motion gives a quick turn to the platen, corresponding to one or two teeth on the wheel **54**, and the paper **48**, under the pressure of rollers **44**, is advanced positively and accurately a distance corresponding to the desired line spacing. The yieldingly mounted rod **43** prevents the inertia of the supply roll **49** from interfering with the proper line-feeding of the paper strip over the platen **40**, as explained in the Patent 1,904,164 already referred to.

Rotation of the platen shaft **46** is imparted to the guide roller **80** through the drive spring **93**, one end of which is fixed to the shaft **46**, the sprocket wheel **91**, which is free on the shaft **46** but is attached to the other end of spring **93**, chain **90** and the sprocket wheel **92** fixed on the shaft **86** of guide roller **80**.

In this manner the quick line-feed motion of the platen is instantaneously taken up by the spring **93** which is under tension to hold the paper taut at all times between the platen **40** and roller **80**, and which now becomes further wound to overcome the inertia of the chain connection and the roller **80** and to set the system in motion. The paper thus is moved along its own plane the very instant the platen begins its movement and independently of slack in the chain drive or play in such gearing as might be substituted effectively for the chain drive.

In the preferred embodiment, and as shown particularly in Fig. 3, the platen **40** and the guide roller **80** are of the same diameter and the upper sprocket wheel **92** is smaller than the lower sprocket wheel **91**, so that the roller **80** has a tendency to pull the paper faster than it is fed by the platen. This tendency is however overcome by the friction of the paper against the platen, brought about by the double set of pressure rollers **44**, which insures that the paper will move in unison with the platen during line-feed. By means of the pressure rollers **87** a certain pull may be exerted on the paper by the guide roller **80**; the pressure of these rollers is however limited to permit the surface of roller **80** to slip under the slower moving paper, and thus to keep the paper taut also during line-feed. It is evident that this slipping action to keep the paper taut may be obtained by making the sprocket wheels of the same size and the guide roller **80** of a larger diameter than the platen **40**.

At the end of the line-feed operation the spring **93** will continue to unwind for a short instant until its tension is no longer able to overcome the friction between paper and guide roller, and the spring will retain this tension for instantaneous action at the commencement of the next line-feed.

This arrangement has been found to effectively prevent sideslipping and bulging of the paper in the exposed area thus insuring continuous operation and a sharp image.

The general arrangement is such that the printer proper may be completely removed from the guiding means and from its mounting in the compartment **12** with little difficulty.

Thus the compartment **12** has a lid **15** which opens upward and a door **14** which opens frontward. The frame **70** is placed on telescoping file drawer racks **71** resting on the base **75** and permitting the printer and frame **70** with uprights **72** and **73** to be partly withdrawn from the cabinet **12**; for this purpose it is only necessary to remove the finger screws **78, 78**, which attach the uprights **72** and **73** by means of bars **77, 77** to the bracket **76**, which forms part of the stationary structure **75**.

With the printer partly removed from the compartment **12**, it may readily be separated from the guiding equipment for complete removal. For this purpose it is only necessary to slightly loosen the two screws **89** clamping the guideplate **81** to the end-bracket **82**; then the brackets **82** and **83** may be slipped off the ends of shafts **46** and **86**; the guide roller **80** may then be slightly lowered to loosen the chain **90** for removal from the sprocket wheel **91** and the printer will be ready for removal.

The optical system comprises a viewing mirror **100** or other reflector, such as a prism, placed opposite the exposed area of the record strip **48** at a 45 degree angle with the normal to said area, so that an inverted image of the area will be reflected upward through the objective or lens system **105** which extends through the lid **15**. The image is received by the mirror **23** in the upper compartment **22** which is placed at a 45 degree angle with the axis of the lens **105**, so that the image will be inverted again and thrown, greatly enlarged, (upon the translucent screen **24**.

The light source for this optical system comprises two incandescent lamps **102** (only one is shown) placed nearly in line with the viewing mirror **100** in front of the exposed record area, so that the image will be obtained by light reflected by the record strip. The light from the lamps **102** is intensified by curved reflectors **104** placed behind the lamps, which are designed in well-known manner to blur the image of the lamp filaments on the paper strip so that the record will appear evenly illuminated on the screen **24**.

The stationary frame **75** is built up in the rear of the cabinet **12** and carries suitable brackets for mounting of the mirror **100**, the lamps **102** with their reflectors **104** and for a blower unit **120**, for cooling the paper in front of the lamps. These parts are grouped behind and to the side of the printer and in no way interfere with the withdrawal of the printer on the telescoping racks **71**.

The objective lens system **105** is mounted in a bracket **76** also fastened to the stationary steel frame **75** so that it too remains in position when the printer is removed. However, it has been found advantageous to provide a pair of con-

necting bars 77, 77 extending from the lens bracket 76 and bolted for easy detachment by the finger screws 78, 78 to the uprights 72 and 73 which are integral with the movable steel frame 70, in order that the printer with its exposed record area and the optical system including the objective 105 may vibrate as a unit, due to the printer operations, and in order that the vibrations may be damped to become practically unnoticeable in the image on the screen 24.

What is claimed is:

1. A message projecting system including a telegraph printer for recording a message on a recording strip and having a platen for automatically and positively feeding said strip in steps into an area of exposure and including guiding means for guiding said strip from the platen to form the said area of exposure tangent to said platen and containing the portion of the recorded message to be projected and further including an optical system for observing and projecting an image of the said portion of the message, characterized in this that said guiding means includes a roller in frictional engagement with said strip and connected by yielding driving means to said platen for pulling said strip forward for each step of said platen whereby said paper is kept taut in said area during line-feed operation.

2. In a projector for telegraph messages, a telegraph printer for recording a message on a recording strip, an optical system including an objective for projecting an image of a portion of the recorded message for display, and guiding means for said strip, said printer having a platen for positively feeding said strip into an area of exposure and said guiding means comprising a roller parallel with said platen and yielding driving means from said platen for driving said roller, said roller being in frictional engagement with said strip for pulling it tight in said area during the feeding movement of said platen, and for guiding said strip from the platen to form a substantially plane area tangent to the platen during the feeding movements to said area exposing to the optical system the portion of the message to be displayed.

3. In a message projecting system, a telegraph printer for recording a message in page form on a recording strip, an optical system including an objective for projecting an image of a plurality of recorded lines for simultaneous display, and guiding means for said strip, said printer having a platen for feeding said strip in definite steps; and said guiding means comprising a roller parallel with said platen and spring pressed friction means, and a spring drive for receiving energy from the step movement of said platen and imparting stored energy to said roller to give instantaneous movement thereto, said spring drive being of such gearing as to give a surface movement to said roller larger than that of said platen for each step movement, said roller engaging said strip to guide it from said platen substantially in a plane for exposure of said plurality of recorded lines to said optical system, and said spring pressed friction means engaging said strip to produce a predetermined friction between said strip and said roller sufficient for said roller to pull the strip taut upon its ejection by the platen and still permitting the roller to continue its movement thereafter with the strip at rest.

4. In a message projecting system, a telegraph page printer for recording characters in upper and lower cases from a recording strip, an optical system for projecting an image of a plurality of recorded lines for simultaneous display, and guiding means for said strip, said printer having a traveling type basket with an oscillating color ribbon and a stationary platen hinged for shift movement and pivoted for line-feed movement in response to signals received by said printer, and said guiding means comprising a roller parallel with said platen and spring-driven from said platen for guiding and pulling said strip from said platen to form during all platen movements a substantially plane area exposing said plurality of recorded lines to said optical system without loss of focus, hinged means for said roller, and spacing means between said roller and said platen for transverse movement of said roller and platen as a unit in response to shifting signals, and spring pressed means for providing a predetermined condition of friction between said strip and said roller.

5. A strip feeding and display device comprising a first and a second feed roller spaced apart to intermittently advance a strip for display of a substantial area of its surface, contacting means for said first roller for positive and instantaneous advancement of the strip therewith toward said second roller, pressure means for said second roller for frictional advancement of the strip therewith, driving means including a shaft for direct driving of said first roller, yieldable means for storing energy from said driving means and for driving said second roller to maintain a substantially continuous tension in the strip between said roller during its advancement.

6. A strip feeding and display system comprising a first feed roller for positive and instantaneous advancement of the strip, a second feed roller for frictional advancement and continuous tightening of the strip, spacing means for holding said rollers apart in parallel relation to display a substantially plane area of the strip, a driving connection between said rollers proportioned so that said second roller tends to advance the strip at a higher speed than it can be fed by said first roller, means for intermittently driving said first feed roller, and yieldable energy storing means inserted in said driving connection for instantaneous driving of said second roller as soon as said first roller begins to advance the strip.

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