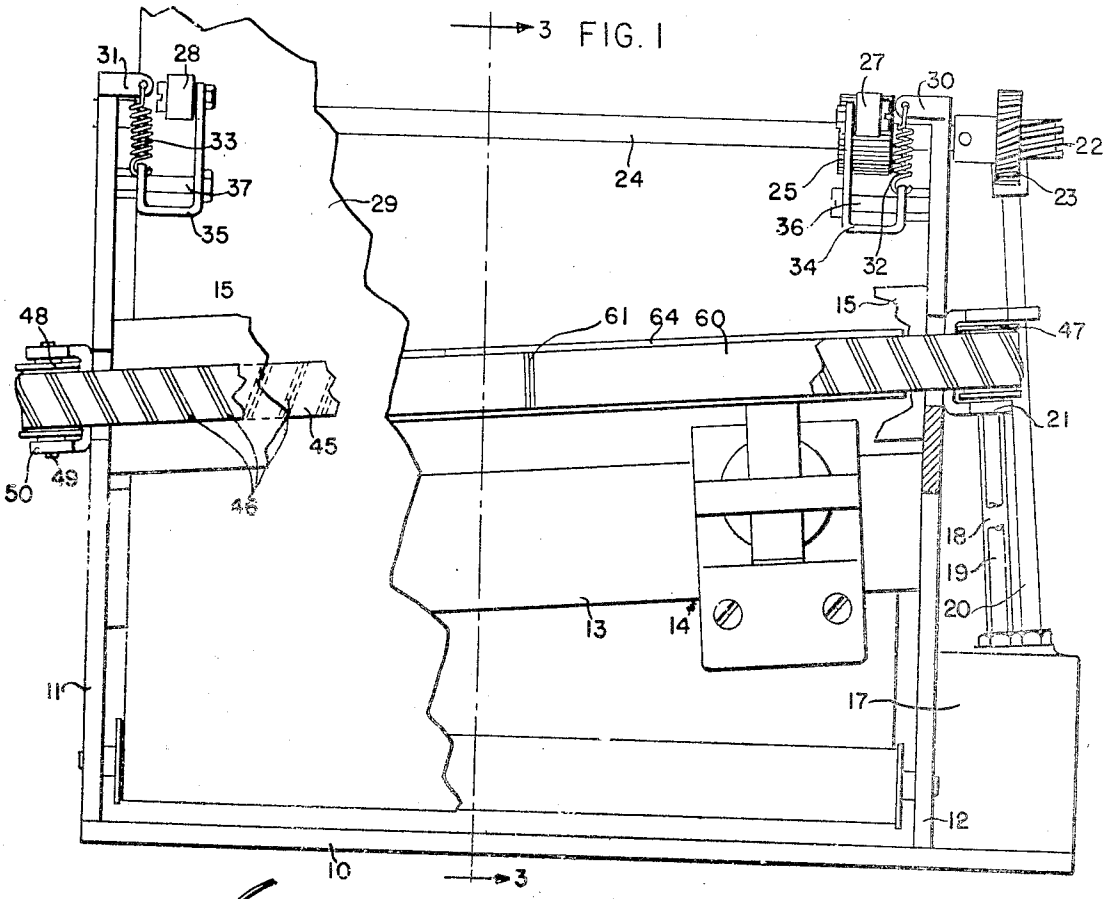
March 2, 1943. C. W. BURCKY 2,312,317

FACSIMILE PAGE PRINTER

Filed Sept. 20, 1941 2 Sheets-Sheet 1

FIG. 1



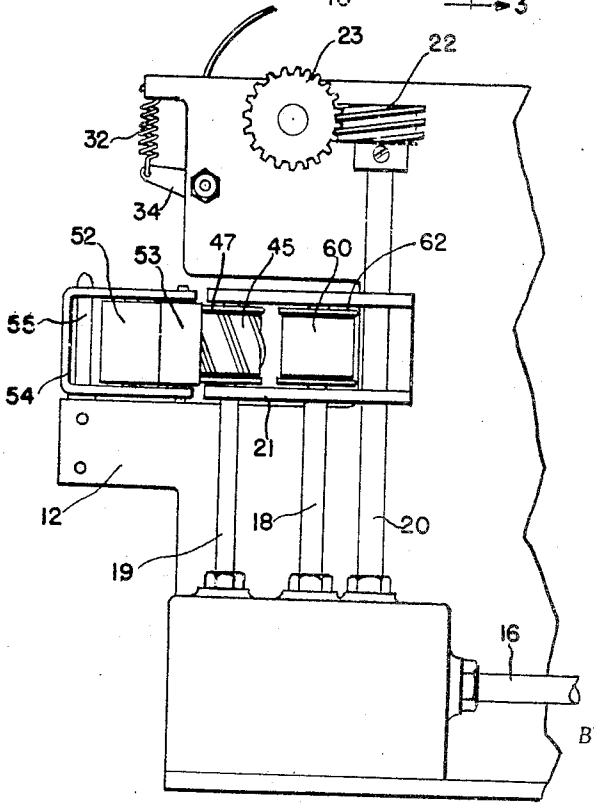


FIG. 4

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FACSIMILE PAGE PRINTER

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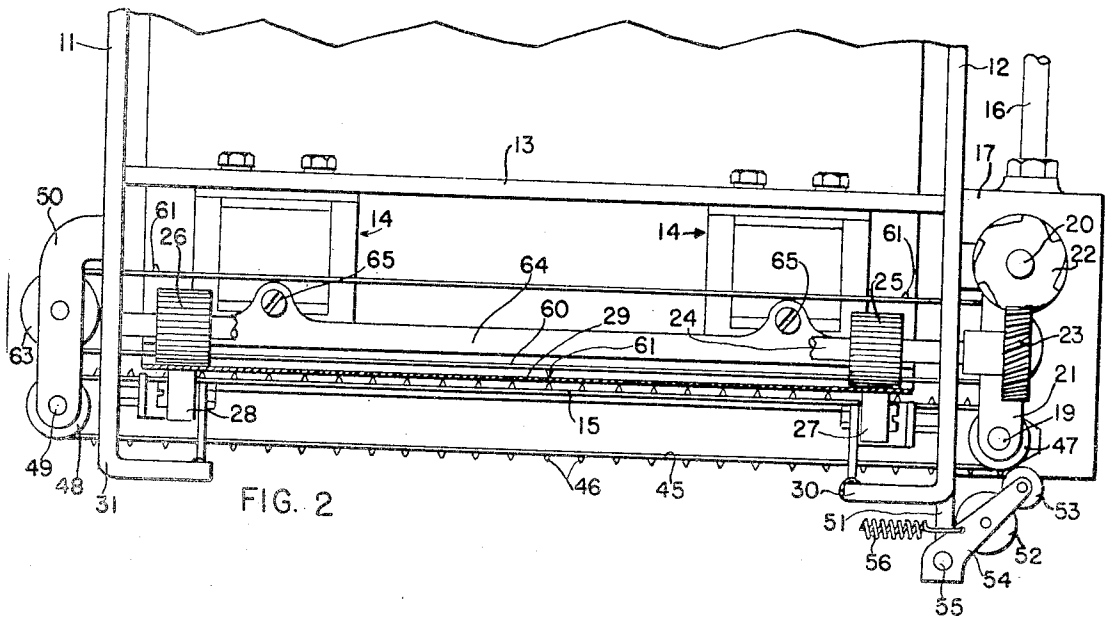


FIG. 2

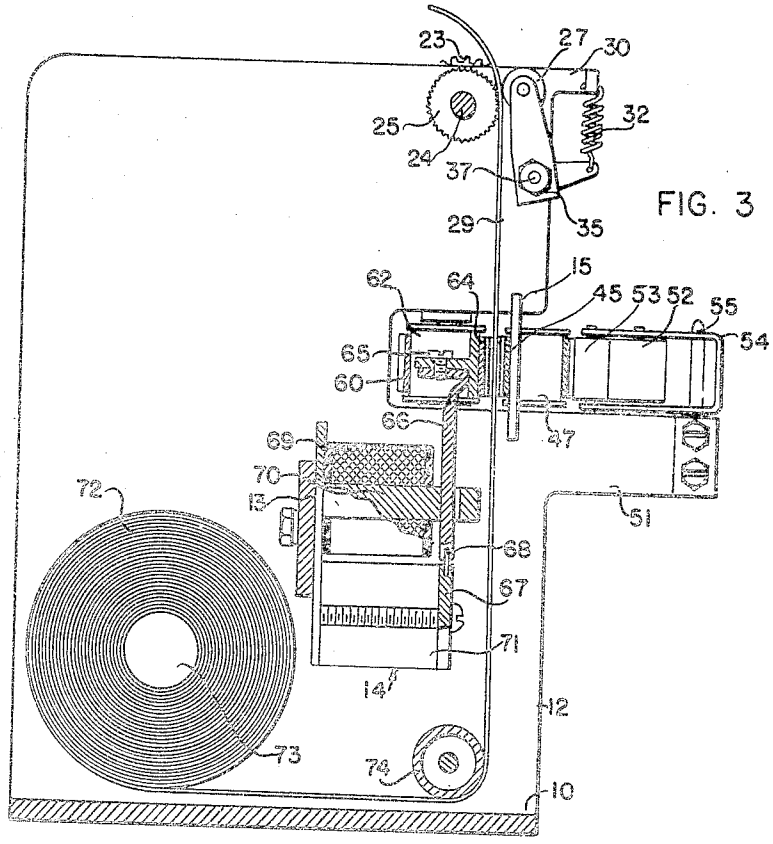


FIG. 3

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UNITED STATES PATENT OFFICE

2,312,317

FACSIMILE PAGE PRINTER

Charles W. Burcky, Park Ridge, Ill., assignor to Teletype Corporation, Chicago, Ill., a corporation of Delaware

Application September 20, 1941, Serial No. 411,667

13 Claims. (Cl. 178—11)

This invention relates to facsimile printing telegraph receiving apparatus and more particularly to a page facsimile printing apparatus.

It is an object of the present invention to provide a simple and compact receiving apparatus for automatically printing received messages.

In accordance with one embodiment of the invention, there is provided a scanning tape which is driven at a relatively high rate of speed across the face of a continuously traveling web of paper. This tape is provided with ridges which are embossed on its surface and project outwardly toward the paper. Means is provided in the apparatus for applying ink to the ridges so that when the paper is forced against the ridges the ink will be transferred from the ridges to the paper, and a stiffening plate is provided for preventing movement of the scanning tape by the paper so that the ink will be transferred to the paper upon the pinching of the paper between the ridges on the scanning tape and one of three ribs or styli formed on a second tape driven at the rear of the paper in such manner that a rib is always in association with the paper. The scanning tape having the ridges or platens on it travels at a rate of speed determined by the speed of transmission of signals at a remote transmitting station. Mounted behind the tape, which has the printing styli on it, is a bar which extends across the web of paper and is mounted for actuation by the armatures of a pair of speaker motors which receive the signals from the transmitting station through suitable radio receiving apparatus and which, upon energization, will move the printing tape, on which the styli or ribs are formed, against the sheet of paper being fed across it, so that the paper will be forced into engagement with the ribbed ridges on the scanning tape moving across the face of the web.

It is noted that the scanning belt, the printing stylus belt, and the paper web are all moving continuously and unidirectionally with respect to each other at predetermined relative speeds. All of the moving parts of the apparatus with the exception, of course, of the speaker motors are driven from a single source of power and are geared together so that the ribs or styli formed on the metallic tape, actuated by the speaker motor, will travel across the web of paper at a speed such that the proper formation of characters in facsimile as described in the patent to Kleinschmidt et al. No. 2,046,328 granted July 7, 1936, will be effected and two characters, one above the other, will be formed. The two lines of identical printing thus formed will be printed straight across the continuously moving web of paper at right angles to the long edge thereof, due to the fact that the traveling tapes and the speaker motor actuated bar or hammer are mounted at an angle to compensate for the angle at which the paper is fed relative to the movement of the tape.

A better understanding of the apparatus will be had by reference to the following detailed description when considered in conjunction with the accompanying drawings, wherein

Fig. 1 is a front elevational view of a facsimile printer embodying the features of the present invention, parts being broken away to illustrate more clearly the construction of the apparatus, and many nonessential elements which may be of any suitable form being eliminated from the structure shown so that the details of the invention itself may be more clearly illustrated;

Fig. 2 is a fragmentary plan view of the apparatus as shown in Fig. 1;

Fig. 3 is a horizontal sectional view, through the apparatus taken along the line 3—3 of Fig. 1 in the direction of the arrows, showing the construction of the printing hammer actuated mechanism; and

Fig. 4 is a side elevational view of the right side of the apparatus shown in Fig. 1.

Referring to the drawings wherein like reference characters designate the same parts throuout the several views, the apparatus is mounted in a framework comprised of a base member 10, side plate 11, and side plate 12. The side plates are interconnected by a diagonal plate 13 which supports a pair of speaker motors 14 and a diagonally disposed platen member 15. Power for driving the various parts of the apparatus is transmitted through a motor shaft 16 which may be driven in any suitable manner. The motor shaft 16 extends into a gear reducer box 17 from which extend three driven shafts 18, 19, and 20 (Figs. 1 and 4) which are driven at speeds proportional one to another, but, no two of the shafts are driven at the same speed, suitable gearing in the gear reducer box 17 being provided for driving the shafts 18, 19, and 20 at proper relative speeds.

Adjacent to their upper ends the shafts 18 and 19 are journaled in a bearing bracket 21, mounted upon the side plate 12. The upper portion of the bracket 21 also serves as a bearing for the shaft 20, and the shaft 20 carries at its upper end a gear 22 in mesh with a gear 23 on the right end (Fig. 1) of a shaft 24. The

shaft 24 carries a pair of paper feeding rollers 25 and 26 (Fig. 2) which have a pair of gripping rollers 27 and 28 associated with them for engaging a web 29 of paper and forcing it into driving contact with the respective rollers 25 and 26. Formed on the side plates 12 and 11 are a pair of projections 30 and 31 which are bent inwardly toward each other and have attached to them contractile springs 32 and 33, the other ends of which are fixed to substantially horizontally extending arms of bell crank members 34 and 35, respectively. The bell cranks 34 and 35 are pivotally supported on posts 36 and 37 extending inwardly from the side plates 12 and 11, respectively, and the bell cranks support on their vertically extending arms the rollers 27 and 28, respectively, for pinching the web 29 of paper between the rollers 27 and 28, and the rollers 25 and 26, the bell crank members 34 and 35 being urged by the springs 32 and 33 to force the rollers 27 and 28 into engagement with the web of paper. Through the mechanism just described the web 29 of paper will be moved past the platen member 15 at a constant speed proportional to the speed of the driven shaft of the apparatus.

An endless tape 45 which is provided with a series of ridges or ribbed projections 46, passes around a pair of rollers 47 and 48, the roller 48 being freely rotatable about a stud 49 mounted in a bracket 50 secured to the side plate 11, and the roller 47 constituting a driving drum or wheel fixed to the upper end of the shaft 19. The side plates 11 and 12 are cut out to receive the inner course of the tape 45, and the plate 12 is provided with a forwardly extending projection 51 for supporting an inking mechanism for transferring ink from an ink roller 52 to the projections or ridges 46 on the tape 45 through the medium of a transfer roller 53. The ink rollers 52 and transfer roller 53 are supported for rotation in a U-shaped member 54 pivoted on a stud 55 extending upwardly from the projection 51, and the U-shaped member 54 is urged to rock in a counterclockwise direction (Fig. 2) by a contractile spring 56. By means of the just described mechanism, ink will be transferred from the ink roller 52 to the projections 46 through the instrumentality of the ink transfer roller 53, the spring 56 urging the ink transfer roller 53 into engagement with the ribs or projections 46 on the tape 45. The tape 45 being driven past the face of the web 29 of paper, may deposit ink on the paper if the paper is forced against the ribs or ridges 46.

Positioned directly behind the web 29 of paper is one course of an endless belt or tape 60 having three printing ridges 61 formed on it for cooperation with the ribs 46 on the tape 45 to pinch the web 29 of paper between the ribs 46 and ridges 61, thereby to transfer ink from the ribs or ridges 46 to the paper in effecting a printing operation. There are, as pointed out hereinbefore, three ridges 61 on the tape 60 so that during the travel of the tape 60 there is always one of the ridges 61 in association with the paper. The tape 60 is driven past the web of paper 29 by the shaft 18 on the upper end of which there is a driving drum 62 about which the tape 60 passes. Mounted for rotation in the bracket 50 is an idler drum or roller 63 which serves to support the left end (Fig. 2) of the tape or belt 60. In this manner, the tape or belt 60 is driven through a path where one course of the tape or belt 60 is directly behind the web of paper 29, and in alignment with the inner course of the tape 45.

Positioned directly behind the course of the belt 60, which is in close proximity to the web of paper 29, is a printing member 64 which extends across substantially the entire width of the web of paper 29. It should be noted that the two tapes or endless belts 45 and 60 and the printing member 64 are disposed at a slight angle to the horizontal as viewed in Fig. 1, this angle being such that one of the ridges 61 in starting from the left-hand side of the sheet or web of paper (Fig. 1) and traveling across the web, will be in association with an area of the web of paper approximately at right angles to the side edges of the web of paper 29 all during its travel across the web as the paper 29 is fed upwardly past the tape 60. In other words, the angle at which the tapes 45 and 60 and the printing members 64 are disposed with respect to the sheet or web of paper 29 passing through the apparatus is such that the ridge 61 which is cooperating with the tape 45 and its ridges 46 will in effect travel straight across the web of paper at right angles to the edges thereof to effect printing in a straight horizontal line across the web of paper due to the relative movement of the web of paper 29 and the movement of the rib or ridge 61. In this manner, the next succeeding rib or ridge 61 to be associated with the web of paper will start at the left edge of the paper one line space below the position at which the previous ridge 21 started, and because of this, line spacing is effected with a constantly moving web of paper and a constantly traveling ridged tape. Of course, in order to insure that the cooperating ridges 61 and 46 will print every character, it may be advisable to have the ridges 61 so positioned on the tape 60 that when the forward ridge 61 is printing the last character at the right side of the web of paper, as viewed in Fig. 1, the next succeeding ridge 61 will print the same character at the left edge of paper thereby to insure that no characters will be lost in receiving a message.

The printing member 64 is substantially T-shaped in cross section and is fixed by means of screws 65 to the upper end of an armature member 66 which is provided with a bent over portion for receiving the screw 65. The armature is hinged to an armature support 67 by a flexible metallic reed 68, and it may be vibrated to actuate the printing member 64 by a coil 69 wound around a core member 70, forming a part of the speaker motors 14 in which there is provided the usual permanent magnet 71 and suitable armature stops, not shown, the assembly being suitably mounted on the diagonal plate 13. The speaker motor assemblies 14 may be of substantially the same construction as that disclosed in the copending application Serial No. 388,430 filed April 14, 1941, by C. W. Burcky and E. A. Gubisch.

At the bottom of the apparatus, as most clearly shown in Fig. 3, there is provided a roll of paper 72 mounted upon an arbor 73 from which the web 29 may be drawn continuously over a guide roller 74 by the paper feed rollers 25 and 26.

In the operation of the apparatus, the motor shaft 16 may be started by any suitable motor control circuit, not shown, to initiate the operation of the machine, and when power is supplied to the motor shaft 16 it will drive the shafts 18, 19, and 20 through the gear reducer 17, at proportional speeds, thereby to drive the tapes or belts 45 and 60 and the paper web 29 continuously. It will be understood that the tapes

45 and 60 and the web 20 will travel at speeds relative to one another to generate a transverse area for printing a line of characters across the web 20, which area will extend substantially at right angles to the edges of the web; also, that the angle of the printing area for each line of printing will not change with variations in motor speed. The printing on the page or web of paper will be effected in the manner exemplified by Figs. 9, 10, and 11 of U. S. Patent No. 2,046,328, wherein the width of the tape 59f (of said patent) represents substantially the width of said transverse area. As stated in said patent, under the heading of "Synchronization," the transmitter and receiver speeds may vary within relatively wide limits without impairing the legibility of the record.

According to said Patent No. 2,046,328, the total area of a letter and space between said letter and the preceding letter is divided into 450 unit areas arranged in eighteen vertical strips or lines. It is understood that this division of a letter to be scanned is optional, and that a letter may be divided into any desirable number of unit areas, and hence any number of vertical lines. It is necessary, however, that whichever division of a letter is adopted at the transmitter, the speeds of the receiver recording elements must be such as to correspond thereto so as to produce a legible character. In the formation of characters in facsimile, the longest line to be inscribed or marked on the paper will be effected by the coils 66 actuating the armatures 68 to hold the printing member 64 against the web of paper 20 long enough to permit one of the ribs 69 to mark the paper with a line of a length equal to the height of the characters being printed, the platen member 45 preventing the tape 65 from moving away from the paper, and the printing member 64 forcing the ridge 61 to cooperate with one of the ridges 46 on tape 45. It is believed that no further description of the details of the method of printing need be described herein, since the printing is effected in substantially the same manner as shown in the Patent No. 2,046,328 to Kleinschmidt et al.

Although a specific embodiment of the invention has been described, it will be understood that numerous adaptations and modifications thereof may be made without departing from the invention, which is to be limited only by the scope of the appended claims.

What is claimed is:

1. In a facsimile printing telegraph apparatus, the combination of a pair of continuously moving ridged tapes, means for driving said tapes continuously on opposite sides of a record web, and signal responsive means for actuating one of said tapes to pinch the web between it and the other tape for effecting printing.

2. In a facsimile printing telegraph apparatus, the combination with a pair of continuously moving tapes having ridges thereon, means for continuously driving adjoining surfaces of said tapes in the same direction at different speeds, means for supporting a record web between said adjoining surfaces, and signal responsive means for causing relative movement between said tapes to pinch the web between said tapes for effecting printing.

3. In a facsimile printing telegraph apparatus, the combination of a pair of continuously moving ridged tapes, means for continuously driving said tapes on opposite sides of a record web, signal responsive means for actuating one of said tapes to pinch the web between it and the other tape for effecting printing, and means for moving the web at a speed proportional to the speed of the tapes.

4. In a facsimile printing telegraph apparatus, the combination of a pair of continuously moving ridged tapes, means for continuously driving said tapes on opposite sides of a record web, means responsive to received signals for actuating one of said tapes to pinch the web between it and the other tape for effecting printing, and means for applying marking material to the ridges on one of said tapes.

5. In a facsimile printing telegraph apparatus, a signal controlled bar, a tape having marking platens thereon, means for moving said tape between the bar and the rear face of a web of paper, a tape having marking ridges thereon, and means for moving said last-mentioned tape across the face of the paper, and signal responsive means for actuating said bar in accordance with received signal impulses to effect corresponding cooperation between said platens and ridges to produce a printed record on said web of paper.

6. In a facsimile printing apparatus, a signal controlled member, a tape having marking platens thereon, means for moving said tape between the signal controlled member and a web of record material, a tape having marking ridges thereon, means for moving said last-mentioned tape across the face of the record material, means for applying ink to the ridges on the second-mentioned tape, and signal responsive means for actuating said member in accordance with received signal impulses to cause corresponding cooperation between said platens and ridges to produce a printed record on said web of paper.

7. In a facsimile printing apparatus, a signal controlled member, a tape having marking platens thereon, means for moving said tape between the signal controlled member and a web of record material, a tape having marking ridges thereon, means for moving said last-mentioned tape across the face of the paper, means for moving the web of record material between the tapes, and signal responsive means for actuating said member in accordance with received signal impulses to cause corresponding cooperation between said platens and ridges to produce a printed record on said web of paper.

8. In a facsimile printing apparatus, a signal controlled member, a tape having marking platens thereon, means for moving said tape between the member and a web of record material, a tape having marking ridges thereon, means for moving said last-mentioned tape across the face of the record material, means for moving the web of record material between the tapes at a rate of speed proportional to the speed of movement of the tapes, and signal responsive means for actuating said member in accordance with received signal impulses to cause corresponding cooperation between said platens and ridges to produce a printed record on said web of paper.

9. In a facsimile printing apparatus, a signal responsive bar, a tape having marking platens thereon, means for moving said tape between the bar and a web of record material, a tape having marking ridges thereon, means for moving said last-mentioned tape across the face of the paper, means for moving the web of record material between the tapes, and means for sup-

plying power to drive the tape and paper continuously at proportional speeds.

10. In a facsimile printing apparatus, the combination of a pair of continuously moving rigid tapes, means for driving said tapes on opposite sides of a record web, means responsive to received signals for actuating one of said tapes to pinch the web between it and the other web for effecting printing, and means for supporting said tapes for movement at a slight angle to the direction of character spacing to compensate for the travel of the web and to continuously effect line spacing.

11. In a facsimile printing telegraph apparatus, the combination of a pair of tapes having cooperating ridges on confronting faces thereof, means for imparting relative continuous movement between said tapes, means for moving a record receiving web between said faces, and signal responsive means for vibrating the ridges of one of said tapes to produce a record.

12. In a facsimile printing telegraph apparatus, the combination of a pair of tapes having cooperating ridges on confronting faces thereof, means for imparting relative continuous movement between said tapes for scanning, and signal responsive means for actuating one of said tapes to pinch a web of record receiving material between its ridges and the ridges of the other tape for effecting printing during relative movement of said tapes.

13. In a facsimile printing telegraph apparatus, the combination of a tape having a plurality of transverse ridges, a cooperating tape having a plurality of parallel oblique ridges confronting said transverse ridges, means for imparting continuous motion in the same direction to both said tapes, and means effective on said first mentioned tape to press said transverse ridges against said oblique ridges in response to received signaling impulses to produce a printed record upon a strip of record receiving material disposed therebetween.

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