July 18, 1950 W. G. H. FINCH ET AL 2,515,864

FACSIMILE RECORDER PRINTER BAR

Filed Dec. 17, 1946

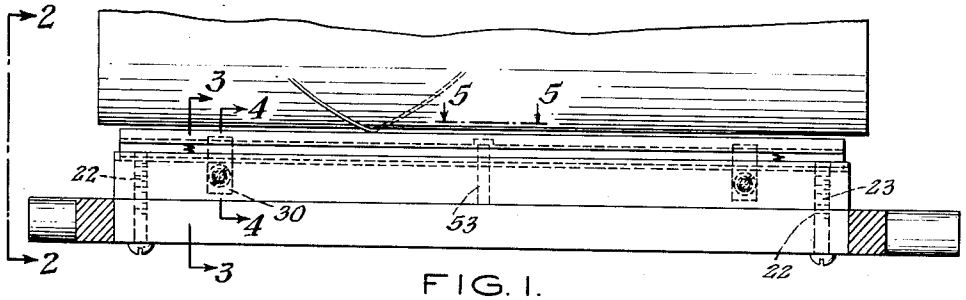



FIG. 1.

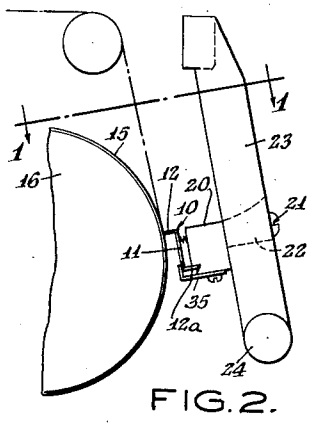



FIG. 2.

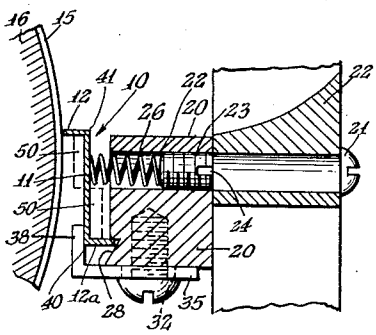



FIG. 3.

ENLARGED VIEW
APPROX. DOUBLE SIZE

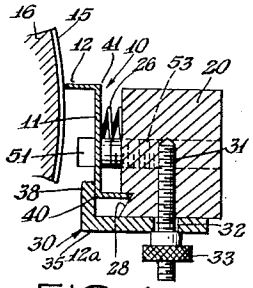



FIG. 4.

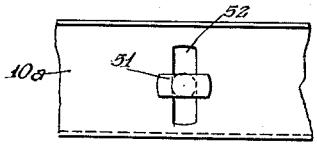
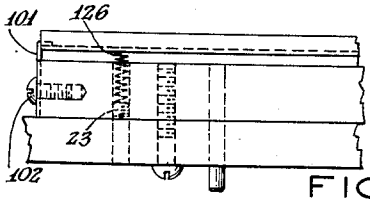



FIG. 5.



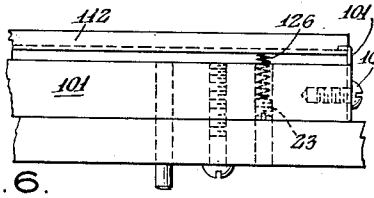




FIG. 6.

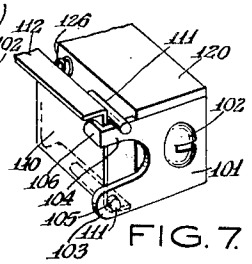
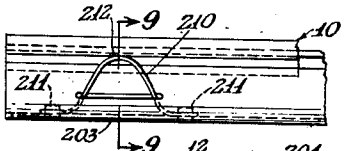



FIG. 7.



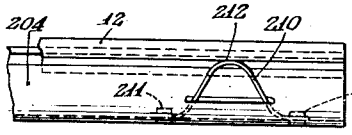




FIG. 8.

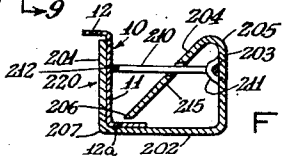



FIG. 9.

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## FACSIMILE RECORDER PRINTER BAR

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Application December 17, 1946, Serial No. 716,774

1 Claim. (Cl. 346—101)

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Our present invention relates to facsimile scanning devices and more particularly to facsimile scanning devices of the type utilizing a knife edge or blade cooperating with a bead or wire helically arranged on a drum.

The type of scanning operation for which my invention is designed is thus of the general character shown in the application Serial No. 554,427, now Patent No. 2,413,962, issued January 7, 1947.

Our present invention relates primarily to the forms and support of the knife blade itself so that it may readily be mounted, adjusted, and replaced in the machine and so that it will always engage the helical bead properly to make a perfect impression.

Heretofore in the construction and operation of helical recorders utilizing a knife blade engaging a helical bead on a drum, various attempts have been made to obtain the proper recording pressure and engagement. The greatest difficulty which arises is the necessity for having an extremely light blade so that ordinary springs may readily retain the same in engagement with the helical bead at all points of contact and where the inertia of the blade itself will not prevent the springs from constantly maintaining such contacts. Also, such difficulties have arisen from the fact that where extremely light blades were used, they tended to be flexible and, therefore, bent around the bead itself thereby thickening the recording line unnecessarily.

Where a very thin blade was used, relying on the width of the blade for stiffness, the blade nevertheless tended to bend and this bending of the blade caused the blade to bow out so that the recording line instead of being a straight line on the paper was a bowed line, and the recording operation was performed not by the edge of the blade but rather by the side of the edge of the blade at the center of the blade and by the edge of the blade itself at the two ends of the blade.

This, apart from interfering with the clarity of the recording, tended quickly to crystallize and destroy the blade itself. An object of our invention is the provision of a novel knife blade for a helical scanning system wherein the knife blade may readily be made rigid and wherein the construction of the elements lends itself to rigidification.

Another object of our invention is the provision of novel mounting means for the knife blade in the helical scanning system whereby the knife blade itself is resiliently mounted while, nevertheless, the blade as a whole acts as a single stiff member.

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Another object of our invention is the provision of novel supporting means whereby a stiff blade may be resiliently mounted with respect to a helical scanning system so that the blade will at all times maintain perfect contact with the helical scanning bead at every position thereof without bending or flexing in order to maintain such contact.

The foregoing and many other objects of our invention will become apparent in the following descriptions and drawings in which

Figure 1 is a top view of a portion of a facsimile recorder embodying my novel knife blade support.

Figure 2 is a side view of the portion of the facsimile recorder of Figure 1 taken from line 2—2 of Figure 1.

Figure 3 is a cross-sectional view taken on line 3—3 of Figure 1 looking in the direction of the arrows.

Figure 4 is a cross-sectional view taken on line 4—4 of Figure 1 looking in the direction of the arrows.

Figure 5 is a top view taken from line 5—5 of Figure 1 showing a modified means for clamping the knife blade in place.

Figure 6 is a view corresponding essentially to that of Figure 1 showing a slightly modified method for supporting the knife blade in position.

Figure 7 is an end view of the modification of Figure 6 showing the support in greater detail.

Figure 8 is a modified view of an alternative knife blade support.

Figure 9 is a cross-sectional view taken on line 9 taken on Figure 8 looking in the direction of the arrows.

Referring now to Figures 1, 2, 3, and 4 our novel recording system comprises a knife 10 preferably of a Z-shaped form having a main portion 11 and blade elements, 12, 12. Either of the blade elements 12 may be mounted in the support so as to cooperate with the bead 15 on the drum 16.

The method of operation is then generally in accordance with the principles set forth in application Serial No. 554,427.

As above pointed out, however, it is necessary that the blade be made as rigid as possible while, nevertheless, it be resiliently mounted so that it may press against the bead 15 at every position of the bead. This has been a real problem in facsimile recording because the point of contact with the bead moves rapidly from one end of the blade to the other.

In a recording done at 100 lines per inch and

one inch per minute at this point of contact thus moves across the knife blade from one end to the other 100 times a minute. Accordingly, the blade must be light; it must be rigid, and the supporting means must be such as to maintain even contact at every point.

For this purpose my novel blade 10 is mounted in a novel support 20, which support in turn is carried in any appropriate manner as by the screws 21 on a cross bar 22 which in turn is carried on a frame member 23, the said frame member 23 being pivotally supported at pivots 24 so that the entire assembly, including the knife blade, may be swung out of the engagement with the drum 16 to permit the changing of blades 10 and the loading or adjustment of the machine.

The support 20 is provided with a pair of threaded openings 22, 22 adjacent the ends of the support with said openings being directed toward the knife blade. The openings 22 are threaded and receive the screws 23, 23, which screws may be adjusted either by a screw driver entering the slot 24 or may be adjusted by a socket wrench where the ends of the screws are squared off.

The screws 23 carry at the end thereof the springs 26, 26 which emerge from the openings 22 and bear against the under surface of the main body portion 11 of the knife blade 10, thus biasing the knife blade 10 and its scanning edge 12 against the bead 15. The support 20 is also provided with the notch 28 in which the blade portion 12*a*, which is not used for scanning purposes at the time, rests.

The support also is provided with the retaining members 30, 30 which are held in position on the threaded bolts 31 by openings 32 therein which rest on the said bolts. The retaining members 30 may be tightened in retaining position by the knurled nut 33 threaded on the bolt 31 and encasing the body portion 35 of each retaining member 30 between the nut and the side of the support 20.

Two such retaining members 30 are used. The said retaining members each have a reentrant flange 38 extending over the notch 28. The blade 10 may thus be readily mounted in position by being slid in from the end. The blade element 12*a* is slid into the end of the notch 28, while the shoulder 40 between the blade element 12*a* and the main body 11 of the blade 10 is slid under the reentrant flange 38 on one side, the body portion 11 of the blade being at the same time slid over the end of the spring 26 which is pushed down for this purpose.

The entire blade 10 is then slid over until the end thereof reaches the opposite retaining member 30, at which time the shoulder 40 is slid under the flange 38 on that side and the body portion 11 is slid over the spring 26 on that side. The blade 10 is thus mounted in position where the springs 26 bias the same toward the drum so that the blade portion 12 contacts the bead 15 of the drum. The reentrant flange 38 of the retaining members 30 prevents the blade 10 from being pushed out of the support.

At the same time, the bead 15 pushes the blade portion 12 of the knife member 10 back against the support 20, this force being resisted by the springs 26 which thus bias the blade portion 12 of the knife member 10 against the bead 15. The construction of the knife member 10 is such as to rigidify the same against bending or bowing. The blade elements 12 are made extremely short with respect to the main body portion so that the rigidity obtained by the bends at 40 and 41 is imparted to the blade itself.

Thus, in a practical commercial device, each of the blade elements 12 and 12*a* is one eighth of an inch high, while the base portion 11 is approximately one half an inch wide and the gauge of metal which is sufficiently small to be consistent with markings of 100 lines to an inch.

It will be obvious that many modifications of the basic principles herein disclosed may be used. Where additional rigidity is required even though the conformation of the blade produces all the rigidity that should be necessary, additional rigidifying pieces 50 may be secured in any suitable manner as by brazing or welding to the opposite side of the base member 11 of the knife 10, the said rigidifying strips being so arranged that they will not interfere with the operation of the spring 26 as shown.

These rigidifying strips 50 are indicated in dotted lines since for all ordinary applications they are not necessary. The conformation of the blade provides sufficient rigidity. It will also be obvious that the blade elements 12 and 12*a* may be formed to enhance their rigidity. Thus, they may be longitudinally corrugated or they may be made partially tubular in form, or they may be given an I-beam cross-section with one of the legs of the I being extended to form the blade or additional rigidifying strips or tubes may be secured to the blade elements 12 and 12*a*.

Also, it will be obvious that the retainer members 30 with their reentrant flanges 38 need not necessarily be individual pieces as shown but may be a continuous strip extending along the entire support. Also, in addition to the supporting means shown in Figures 1 to 4, the blade may be further supported by a clamp member which is rotatable 51 entering the slot 52, the said rotatable member 51 being rotatably mounted on the stud 53 in the support 20.

The conformation of the rotatable member 51 permits the slot 52 in the blade 10*a* to be slipped therefrom, and then the rotatable member 51 may be rotated to clamp the blade 10*a* in position. This is preferably used in connection with the securing element shown in Figures 1 to 4, although this form of securement may be used in place of the retaining members 30 of Figures 1 to 4.

In Figures 6 and 7, we have shown a modified form of securement and support for any blade. The blade 110 here shown has substantially the construction of blade 10 of Figures 1 to 5. This blade, however, is provided with the extending pin 111 at all four corners.

The support 120 has substantially the form previously described in connection with support 20 of Figures 1 to 5, but the support 120 does not have a notch nor does it have retaining members 30. The support 120 is, however, provided with springs 126 which operate in the same manner as previously described.

The elements which mount the knife blade 110 on the support 120 are the side securement members 101 which are secured to the ends of the support 120 by screws 102. The securement members 101 have upstanding legs 103 and 104. Leg 103 is provided with an opening 105 to receive the pin 111 in such manner that the blade 115 is pivotally supported at the edge of the blade member 110 opposite the knife edge 112.

By providing the pins 111 at all four corners of the blade member 110, it is possible to reverse the blade when one of the blade elements is

worn out. Leg 104 is provided with the reentrant flange 106; the two reentrant flanges at each end of the support 120 thus prevent the blade member 110 from being forced entirely out of position by the springs 126 and limit the movement of the blade member 110 in response to the springs 126.

Flanges 106 are so proportioned, however, that the bead of the drum when it bears against the blade or edge 112 of the blade member 110 forces the member 110 against the springs 126 and away from the flanges 106. It will, thus, be seen that in order to mount the blade member 110 in position, it is necessary to loosen the screw 102 sufficiently to permit the pins 111 to be introduced into the opposite holes 105 and then to tighten the screw 102. This need merely be done on one side.

The form of Figures 6 and 7 thus requires a slight degree of manipulation in order to mount or replace a knife blade and also requires that pins 111 be soldered or otherwise secured to the knife blade. However, the construction thereof is simple and operative although the construction of Figures 1 to 4 is preferred.

In Figures 8 and 9 I have shown a still further modified and preferred form of knife blade mounting. The blade here used is identical with the blade 10 of Figures 1 to 4.

A mounting support 220 is an angularly bent metallic member having a face 201, a base 202, and an opposite vertical member 203, the three elements, 201, 202, and 203, forming a U-shaped channel-like construction.

A retaining panel 204 is bent up at 205 from the element 203 and is so arranged that its edge 206 terminates adjacent the end 207 between elements 201 and 202 of the channel-like support 220. Leaf spring members 210, 210 are mounted in suitable supports 211, 211 in the section 203 of the support member 220. The said leaf springs may simply consist of screened wire, one end of the spring being caught in one of the supports 211 and being slidable with respect to the other.

The upper loops 212, 212 of the springs 210 project outwardly through the slots 215 in the retaining member 204 to bear against the back of the support element 201. It will thus be seen that the blade 10 may be slid into the support element 220 from the side, the leg 12a thereof entering between the edge 206 of section 204 of



the support and the base 202 of the support and the main section 11 of the blade 10 extending in surface-to-surface engagement with the face 201 of the support and being held in engagement therewith by the springs 210.

By this means, therefore, a simplified support is provided in a one-piece construction which permits the blade 10 to be slidably inserted and removed, reversed and replaced. The curve at 212 of the springs 210 permits this sliding action to occur without any manipulation of any kind whatever, and the supporting member is of simple construction and formation. The support member 220 may have any suitable piece of insulating material secured thereto in any appropriate manner in order to facilitate the mounting of the support and blade 10 which it carries on the frame or any other portion of the facsimile recorder.

In the foregoing, we have described our invention only in connection with a specific preferred embodiment thereof. Many variations and modifications of our invention should now be obvious to those skilled in the art. Accordingly, we prefer to be bound not by the specific disclosures herein contained, but only by the appended claim.

We claim:

In a facsimile receiver comprising a scanning system including a rotatable drum; a helical bead on said drum; a printing bar engaging said bead; said printing bar extending longitudinally of said drum parallel to the axis thereof and having a substantially Z-shaped cross section; the longitudinal elements forming the top and bottom of the Z being of the order of one-eighth inch in width and the longitudinal element forming the main body of the Z being of the order of one-half inch in width.

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GOTTFRIED H. HOHMANN.


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