

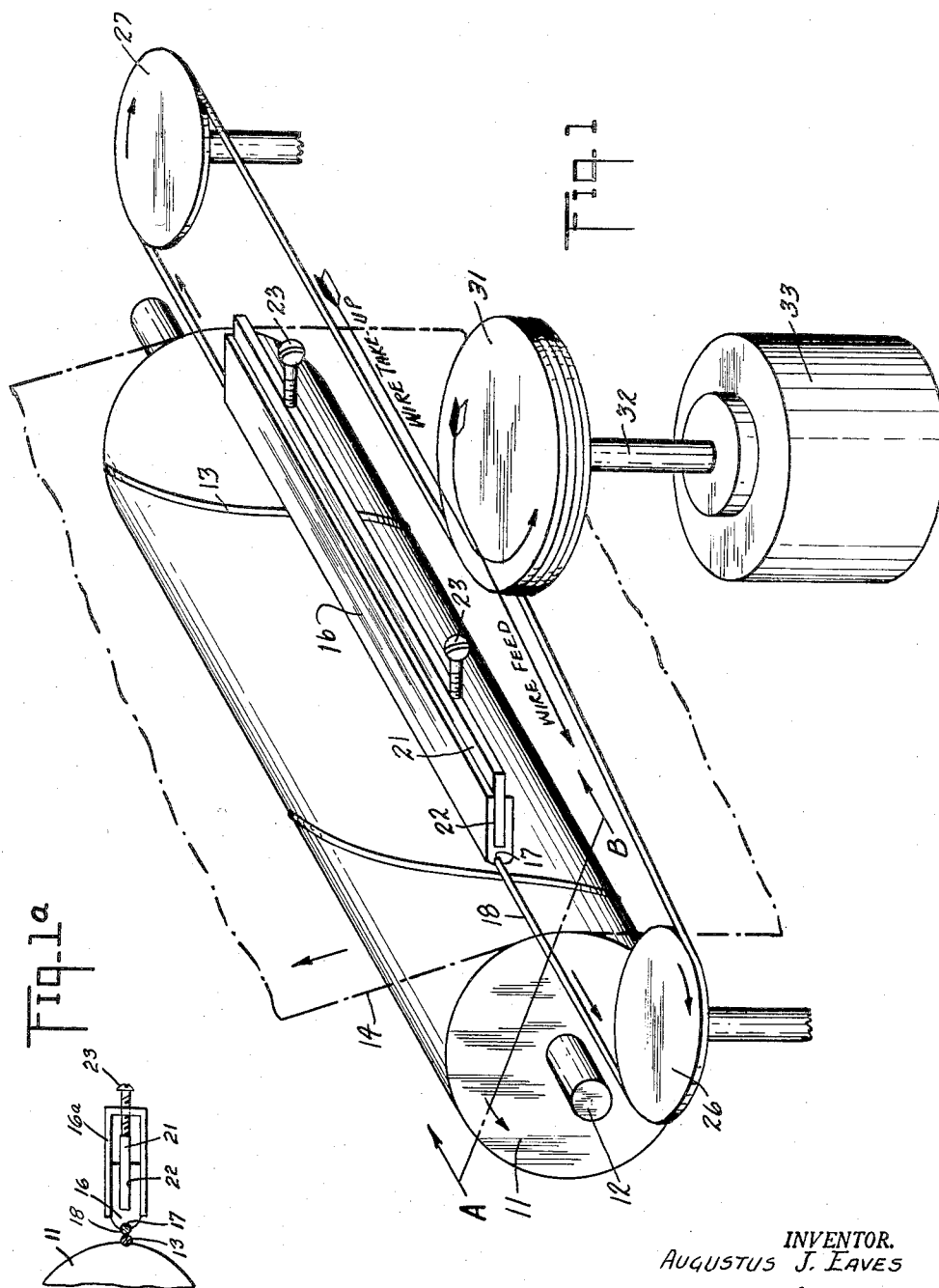
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A. J. EAVES
FACSIMILE DEVICE

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

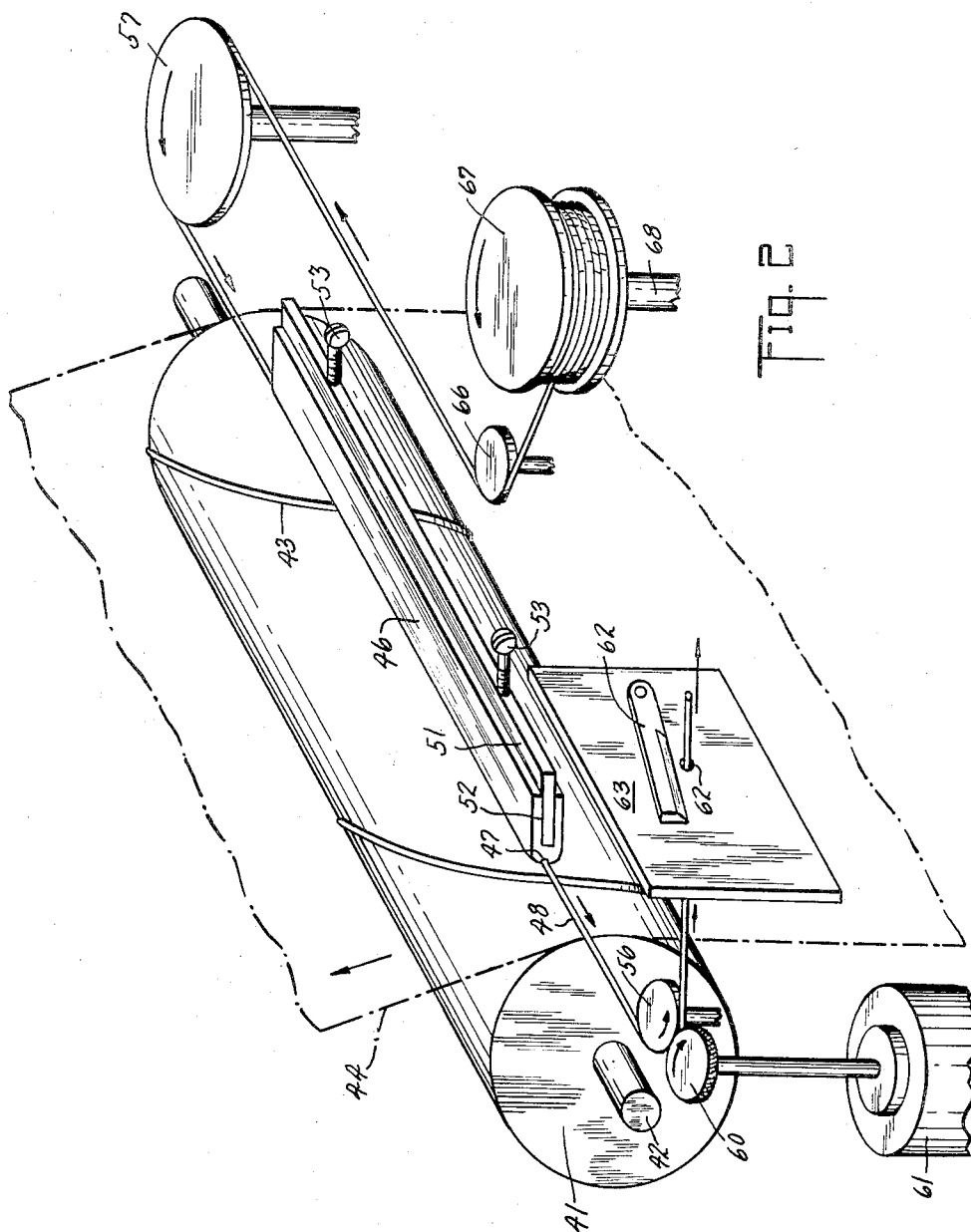


Fig. 2

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FACSIMILE DEVICE

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8 Claims. (Cl. 346—101)

The present invention concerns a facsimile device and in particular concerns a continuous feed printer wire mechanism for a helix-type page-printing facsimile recorder.

In conventional page-printing facsimile recorders it is customary to provide a cylindrical drum upon which is mounted a helix wire over which passes a recording page. A thin metal printer bar extends across the full width of the recording page or drum. The marking signal fed to the printer bar is thus available across the whole surface width. The recording spot consists of the intersection between the printer bar and the second conductor formed by the helix wire wound on the drum. The drum rotates synchronously with a transmitting scanner so that the point of intersection between the printer bar and helix wire moves along the length of the printer bar, and thus across the page, in unison with the transmitter scanning motion, with each marking-signal increment passing through the recording paper between the printer bar and helix wire at the proper point. In this type of recorder the printer bar is usually a steel edge a few thousandths of an inch thick. In an attempt to provide uniform density along its entire length, the printer bar is mounted to exert uniform pressure against the helix wire along its whole length.

A critical defect in this conventional type of recorder arises because the printer bar is subject to wear from friction and also from the marking reaction which ordinarily is unevenly distributed along its length. Attempts to overcome such wear have conventionally taken a form of compensating for unequal pressure and wear by arranging unique mechanical supports for the printer bar. These attempts for the most part have been unsuccessful because even with the most highly refined type of mechanical support there continues to be aggravated wear both from friction and from the marking reaction.

The present invention overcomes these difficulties by replacing the printer bar with a guide bar having a groove in its leading edge adjacent the helix wire, and providing a printer wire that feeds continuously along such groove and thereby provides a continually changing and fresh printer wire that eliminates wear from friction and from the marking reaction.

An object of the invention is to provide a facsimile device.

Another object is to provide a facsimile device having a continuous feed printer wire mechanism.

Another object is to provide a device of this type having a printer mechanism adapted for feeding a signal to a helix wire in which the printer mechanism includes a continuously changing printer wire.

Another object is to provide a device of this type in which the direction of feed of the printer wire is reversible.

Another object is to provide a device of this type in which there is an automatic means for cutting or chopping off printer wire that passed through the printer mechanism.

Another object is to provide a novel resilient support

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for the guide bar forming part of the printer mechanism.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a diagrammatic view of a preferred embodiment of the invention,

Fig. 1a is a sectional elevation of part of the same, with the section taken approximately along the line A—B of Fig. 1 and showing a support for the printing bar, and after the drum has been rotated somewhat from its position in Fig. 1; and

Fig. 2 is a diagrammatic view of a modified embodiment of the invention.

As seen in Fig. 1 there is provided a cylindrical drum 11 mounted for rotation by a shaft 12. The length of drum 11 in the direction of its axis is approximately the same as the width of a recording page 14. Wrapped in a helix about drum 11 from one end to the other is a scanning wire 13 that is stretched over the surface of the drum 11 and extends once around the circumference and from one end of drum 11 to the other.

Disposed adjacent scanning wire 13 and parallel to drum shaft 12 is a printer mechanism including a guide bar 16 that is almost as long as drum 11 and that is disposed with its leading edge closely adjacent scanning wire 13. Guide bar 16 may be of steel or other suitable material. Along its leading edge guide bar 16 is provided with a longitudinal groove 17 through which is adapted to be fed printer wire 18 in such manner that printer wire 18 and scanning wire 13 at their intersection form a recording spot on page 14. Facsimile page 14 is shown passing in an upward direction over drum 11 and between scanning wire 13 and printer wire 18. Each marking signal increment passing through the recording spot formed by the intersection of printer wire 18 and scanning wire 13 thus passes through page 14 to form a permanent recording.

To provide uniform density along the length of printer wire 18 it is necessary for guide bar 16 to exert uniform pressure against scanning wire 13 along its whole length. To this end there is provided a U-shaped mounting 16a (Fig. 1a) for guide bar 16. A sponge rubber tongue 21 is seated in a groove 22 formed in the trailing edge of guide bar 16 remote from groove 17. Sponge rubber tongue 21 forms a tight fit with guide bar 16. Tension adjusting screws 23 are mounted in the fixed support 16a and are adjustable to urge tongue 21 and guide bar 16 toward drum 11 with adjustable force whereby the tension on printer wire 18 is adjustable, and each end of bar 16 may be moved toward or from the drum independently of the other end.

There is provided a feed mechanism for continuously feeding printer wire 18 along groove 17 of guide bar 16. This comprises a first pulley 26 disposed adjacent one end of helix drum 11 and a second pulley 27 disposed adjacent the opposite end of drum 11. Between pulleys 26 and 27 is a reel 31 mounted upon a shaft 32 and adapted to be rotatably driven by motor 33. Motor 33 is reversible so that the direction of rotation of reel 31 can be reversed.

Printer wire 18 in extending beyond the ends of guide bar 16 is turned about pulleys 26 and 27 and is wound upon reel 31 in such manner that upon rotation of reel 31 in a given direction printer wire 18 unwinds from reel 31 over one of pulleys 26, 27 and winds upon reel 31 from the other of pulleys 26, 27. By reversing the direction of rotation of reel 31, the direction of movement of printer wire 18 along groove 17 is reversed. If desired, printer wire 18 can be made endless or continuous with itself in which case it is looped about reel

31 in such manner that it continuously feeds on to reel 31 from one of pulleys 26, 27 and off from reel 31 to the other of pulleys 26, 27.

In Fig. 2 there is shown an alternate embodiment of the invention. In this form of the invention there is provided a cylindrical drum 41 mounted for rotation by a shaft 42. Wrapped in a helix about drum 41 from one end to the other is a scanning wire 43 that is stretched over the surface of drum 41 and extends once around the circumference and from one end of drum 41 to the other.

Disposed adjacent scanning wire 43 and parallel to drum shaft 42 is a guide bar 46 that is almost as long as drum 41 and it is disposed with its leading edge closely adjacent scanning wire 43. Along its leading edge guide bar 46 is provided with a longitudinal groove 47 through which is adapted to be fed printer wire 48 in such manner that printer wire 48 and scanning wire 43 at their intersection form a recording spot on page 44.

Facsimile page 44 is shown passing in an upward direction over drum 41 and between scanning wire 43 and printer wire 48. Each marking signal increment passing through the recording spot formed by the intersection of printer wire 43 and scanning wire 43 thus passes through page 44 to form a permanent recording.

There is provided a mounting for guide bar 46 comprising a sponge rubber tongue 51 that is seated in a groove 52 formed in the trailing edge of guide bar 46 remote from groove 47. Sponge rubber tongue 51 forms a tight fit with guide bar 46. Tension adjusting screws 53 are mounted in a fixed support (not shown) and are adjustable to urge tongue 51 and guide bar 46 toward drum 41 with adjustable force whereby the tension on the printer wire 48 is adjustable.

There is provided a feed mechanism for continuously feeding printer wire 48 along groove 47 of guide bar 46. This comprises a first pulley 57 disposed adjacent one end of drum 41 and a second pulley 56 disposed adjacent the opposite end of drum 51. Disposed in driving contact with second pulley 56 is a driving spool 60 adapted for rotation by a drive motor 61.

Printer wire 48 extending beyond guide bar 46 to the right as seen in Fig. 2 is passed around first pulley 57; to the left printer wire 48 is positively driven over second pulley 56 by the driving action of spool 60. Printer wire 48 after passing over second pulley 56 and past driving spool 60 is guided through an opening 62 in a shear plate 63. Mounted for chopping action on shear plate 63 is a cutter blade 62 adapted to chop off the used portion of printer wire 48 as it passes through opening 62.

Disposed between pulleys 56 and 57 is a reel 67 mounted upon an idler shaft 68. An idler pulley 66 is disposed adjacent reel 67. Printer wire 48 extending beyond the ends of guide bar 46 is turned about pulleys 56 and 57. The part of printer wire 48 passing beyond driver spool 60 is chopped off on shear plate 63 as above described. Fresh wire upon reel 67 is unwound over idler pulley 66 and fed to pulley 57 under the driving influence of driver spool 60.

Guide bar 16 or 46 is mounted adjacent scanning wire 13 or 43 and parallel to drum shaft 12 or 42. Printer wire 18 or 48 is then threaded from reel 31 or 67 over pulleys 26, 27 or 56, 57 and through groove 17 or 47. The free end of printer wire 18 in Fig. 1 is fed back on to reel 31; the free end of printer wire 48 in Fig. 2 is fed through opening 62 of shear plate 63. Tension adjustment screws 23 or 53 are adjusted to regulate the tension in printer wire 18 or 28. Drive motor 33 or 61 is started to feed printer wire 18 or 48 continuously through groove 17 or 47. In the construction shown in Fig. 1 drive motor 33 is reversible so that printer wire 18 can be fed in either direction through groove 17 and printer wire 18 can therefore be used more than once by simply reversing the direction of feed. Also reversing the direction of

feed has the advantage of reversing the effects of wear from friction and also from the marking reaction.

There is thus provided a facsimile device in which the printing mechanism for all practical purposes eliminates wear from friction and from the marking reaction. This is accomplished by the novel continuous feed printer wire mechanism together with the novel sponge rubber support for the guide bar and also together with reversal of the direction of feed of the printer wire in one form of the invention. In the other form of invention the novel chopping device for chopping off used printer wire aids in achieving the improved results.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

I claim:

1. In a facsimile device, a rotary scanning helix wire, a printer mechanism for use therewith comprising a guide bar extending along the helix parallel to the helix axis, the edge of said bar adjacent the helix having a longitudinal groove from end to end thereof, a wire seated in said groove and extending along and beyond said guide bar, means for feeding said wire along said groove, a support for said bar enabling the bar to rock in a plane including the axis of said helix and including a sponge rubber tongue secured to said bar remote from the groove therein, and means engaging said sponge rubber to provide substantially steady force between said wires whereby said wires are adapted for firmly engaging with a substantially steady pressure a sheet of paper disposed and moving therebetween.

2. In a facsimile device, a rotary drum upon the peripheral surface of which is wound a scanning helix wire, a printer mechanism comprising a guide bar extending along the helix parallel to the helix axis, the edge of said bar adjacent the helix having a longitudinal groove from end to end thereof, a wire seated in said groove and extending beyond the ends of said guide bar, a pair of pulleys disposed one adjacent each end of said drum and beyond the ends of said bar, said wire from the ends of said bar being turned on said pulleys, a reel disposed between said pulleys and connected to the wire portions turned on said pulleys, means for turning said reel to feed said wire over one pulley and through said guide bar groove and around said other pulley, said reel being adapted upon turning to take up wire from the second pulley.

3. In a facsimile device having a rotary helix drum and a scanning helix wire wound thereon, a printer mechanism comprising a guide bar extending along the helix parallel to the helix axis, the edge of said bar adjacent the helix having a longitudinal groove, a wire seated in said groove and extending beyond said guide bar, a support for said bar including a sponge rubber tongue secured to said bar remote from the groove therein, means engaging said sponge rubber to provide substantially steady force between said wires whereby said wires are adapted for firmly engaging with a substantially steady pressure a sheet of paper disposed and moving therebetween, a reel disposed adjacent said guide bar and adapted to have a supply of wire wound thereon for feeding therefrom, a first pulley adjacent one end of said helix drum and adapted to have said wire pass thereabout and into said guide bar groove, a second pulley disposed adjacent the other end of said helix drum, said wire being wound about said second pulley, a driver wheel adjacent said second pulley adapted upon rotation to drive said wire over said second pulley, a shear plate adjacent said driver wheel, said shear plate having an opening through which said wire is adapted to pass, and a cutter mounted on said shear plate for cutting wire passing therethrough.

4. A printer mechanism adapted for use in a facsimile device comprising a movable scanning electrode means,

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a guide bar formed with a uniform longitudinal groove coextensive therewith and along one edge thereof, said guide bar being positioned with its longitudinal groove disposed contiguous with the scanning electrode means; a wire electrode seated in the groove of said guide bar and extending along the length of and beyond said guide bar; means engaging said wire electrode for feeding said wire electrode along the groove; means supporting said guide bar for free movement toward and from said scanning electrode means, with said bar rockable in the plane of the direction of its movement toward said scanning means, said bar having a sponge rubber tongue extending therefrom and remote from the groove therein; and means engaging said sponge rubber tongue at spaced points therealong and operable thereon to stress it in a direction to move it and through it said bar toward said scanning electrode means, and provide a substantially steady pressure between said wire electrode and the electrode means.

5. A printer mechanism as defined in claim 4 wherein said wire electrode is in the form of an endless wire.

6. A printer mechanism as defined in claim 5 wherein said means engaging said wire electrode for feeding said wire electrode along the groove includes a first idler pulley positioned beyond one end of said guide bar, a second idler pulley positioned beyond the other end of said guide bar, a reel between said idler pulleys and engaging a loop in said wire electrode, and motor means for driving said reel.

7. In a facsimile printing device of the type having a rotatable drum with a scanning helix electrode secured on and extending as a helix about the peripheral surface of the drum, and projecting from that surface in a direction radially of the drum, a printing bar disposed along a side of said drum, a support mounting said bar for bodily movement edgewise toward and from the drum in a direction approximately radial to the drum, to make a record on an electrosensitive record sheet that may be disposed between the drum and bar and movable between them, that improvement therein which comprises said bar having, in its edge nearest said drum, an edgewise opening channel that runs from end to end of the bar and is coextensive therewith, an elongated electrode filling said channel, extending lengthwise thereof and beyond the

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ends of the channel, slidable endwise along said channel, and projecting sideways slightly out of said channel to provide an edgewise projection of said bar for the full length of the bar, means for moving the elongated electrode along said channel to present fresh electrode edgewise in the channel, said support mounting said bar for limited rocking in a plane passing through the projecting side of said elongated electrode and the axis of said helix electrode, and means for applying resilient pressure on said bar tending to urge it toward said drum, locally and solely at spaced intervals along its length, whereby said bar may rock in said plane and make steady contact with said helix electrode along the entire length of the helix as the point of contact between the electrodes moves lengthwise along the printing bar.

8. A facsimile printing device comprising a rotatable drum having a narrow electrode wound helically on the drum periphery to form a helical rib therein, with the axis of the helix approximately coincident with the axis of rotation of the drum, a printing bar disposed edgewise to said drum periphery and extending along a side of said drum, means mounting said bar for free movement in a direction edgewise of itself toward and from said drum and also for limited rocking movement in a plane radial to said drum, means for applying light resilient pressure to said bar, locally and independently at spaced points along the length of the bar, in directions urging said bar edgewise toward said drum, the edge of said bar nearest said drum having therein a channel extending lengthwise of that edge from end to end thereof, a ribbon-like electrode within and fitting said channel, slidable along it, extending beyond both ends of the channel, and projecting sideways of itself out of said channel, and means connected to said last mentioned electrode and operable to move that electrode along said channel.

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