

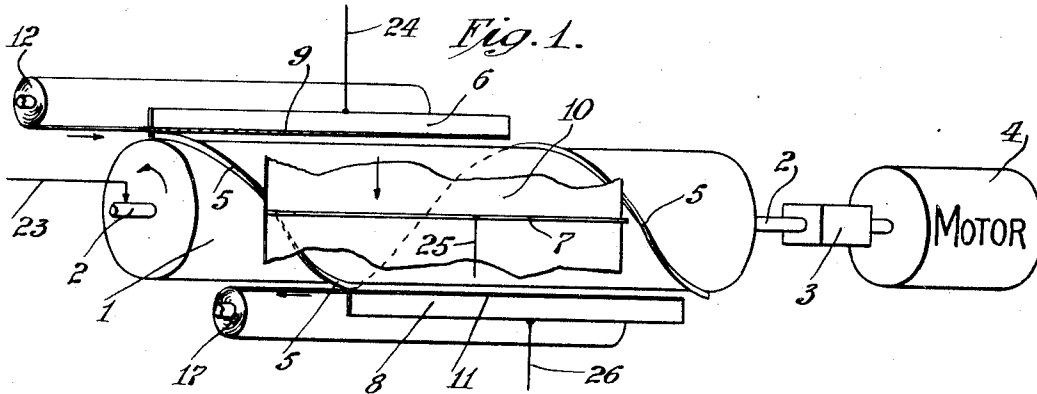
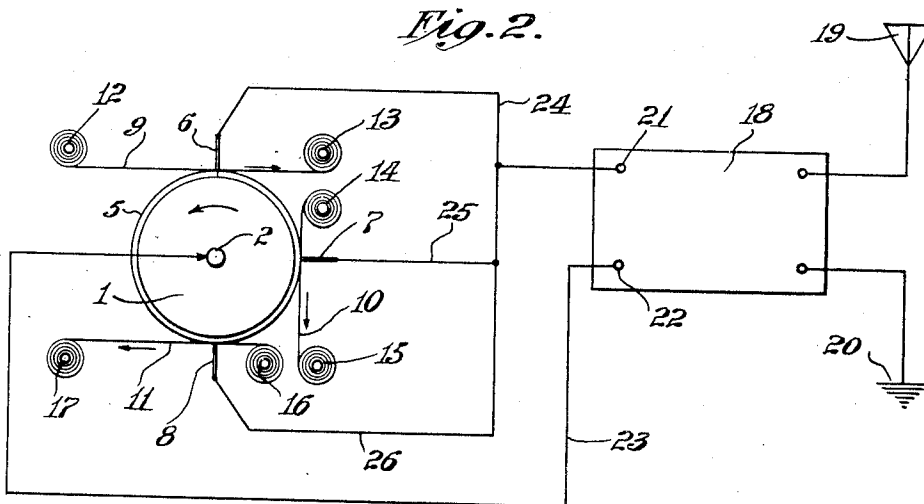
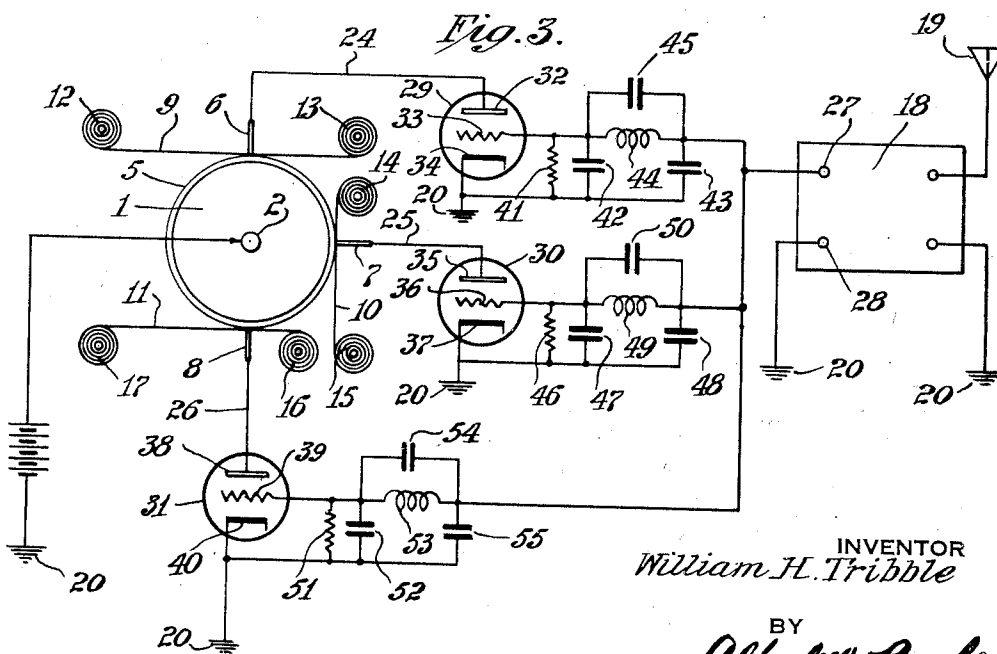
July 31, 1945.

W. H. TRIBBLE
DUPLICATING RECORDER

2,380,482

Filed March 30, 1942

2 Sheets-Sheet 1



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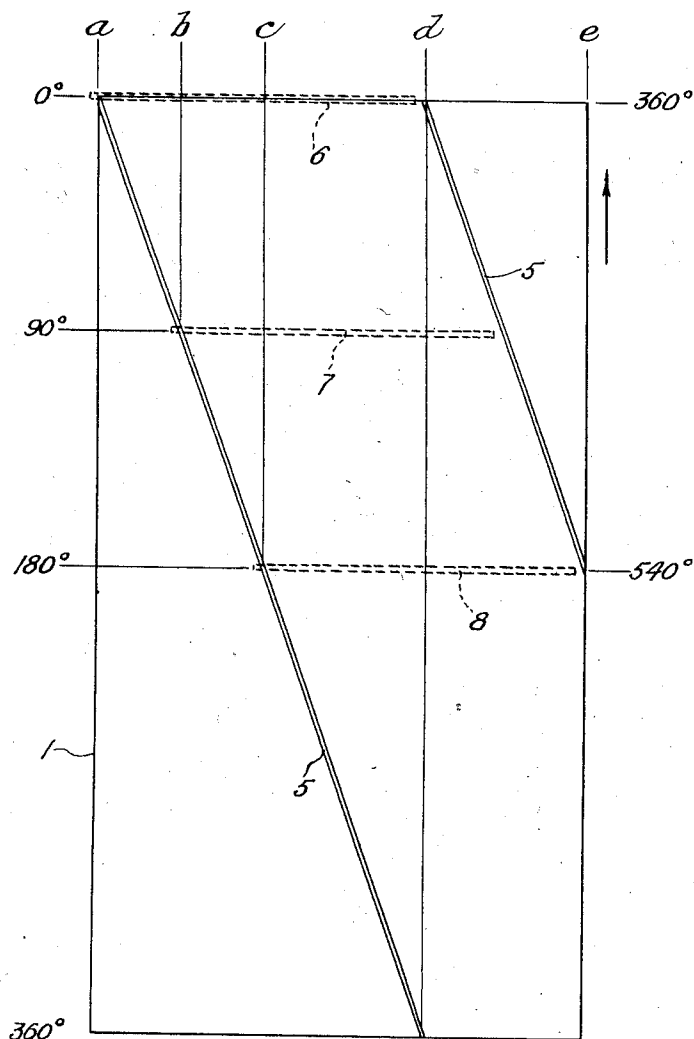
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2 Sheets-Sheet 2

Fig. 4.



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DUPLICATING RECORDER

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6 Claims. (Cl. 234—59)

The present invention relates to facsimile recording scanners and, in particular, to scanners for making two or more copies at the same time.

Facsimile recording consists in marking point by point to produce a record. A convenient carrier for the record is a sheet of paper. One method of marking on a paper sheet is electrolytically by passing a moistened paper sheet between conducting electrodes carrying a signal current. These electrodes are conveniently in the form of a linear electrode and a helix the intersection between which forms a recording point. Rotation of the helix causes the point to move across the sheet and longitudinal movement of the paper completes the scanning process.

The present invention concerns helical scanners for making two or more copies simultaneously. Briefly, the invention consists in two or more linear electrodes, one for each copy, used in conjunction with a suitable helix. In its preferred form the helix is 360 degrees plus the total displacement of the linear electrodes. Thus, if three linear electrodes are used 90 degrees apart, the helix may be 540 degrees long and the drum will be 1.5 times the length of a normal drum. The linear electrodes may all be connected in parallel to a common source of recording signals or each may be supplied from a separately adjustable source.

In the drawings:

Fig. 1 shows in perspective one form of the present invention.

Fig. 2 shows an end view of the device shown in Fig. 1 connected to a radio receiver.

Fig. 3 shows a modified form of the invention.

Fig. 4 shows a development of a portion of the invention to aid in its explanation.

Fig. 1 shows a facsimile scanner drum 1 mounted on shaft 2 and rotated by motor 4 thru a suitable gear box 3. On the surface of drum 1 is mounted a metal helix 5. Suitably spaced around the circumference and along the axis of drum 1 are mounted the linear electrodes 6, 7 and 8 for recording on suitable recording sheets 9, 10 and 11. Sheet 9 may conveniently come from a roll 12 while sheet 11 may be wound after recording on roll 17. One side of the recording circuit is made by wire 23 from which a circuit is completed to helix 5. The other side of the recording circuit is completed to linear electrode 6 thru lead 24, to linear electrode 7 thru lead 25 and to linear electrode 8 thru lead 26. Modulated recording signals are applied between lead 23 and leads 24, 25 and 26 for recording on sheets

9, 10 and 11. Recording is accomplished by rotating drum 1 and moving sheets 9, 10 and 11 at relative rates, so that the moving intersection between helix 5 and linear electrodes 6, 7 and 8 accomplishes the scanning along a line and the motion of sheets 9, 10 and 11 completes the scanning of the sheets. Relative motions of drum 1 and sheets 9, 10 and 11 are shown by the arrows.

In order that all three copies may be phased in the same way, the linear electrodes are displaced along the axis of the helix or drum by an amount such that the axial displacement in percentage of the length of a 360 degree helix is equal to the percentage of displacement around the circumference. In this way, at any instant, recording is performed at corresponding points along a scanning line on each of the three sheets. Proper phasing of the drum for centering the recording on one sheet then automatically centers the recording on the remaining sheets. For special requirements, other relative axial and circumferential spacings may be employed.

Fig. 2 shows an end view of the form of the invention shown in Fig. 1. The relation of helix 5 to linear electrodes 6, 7 and 8 is shown. Sheet 9 may unwind from a roll 12 and may be re-wound after recording on roll 13. Similarly, sheets 10 and 11 may unwind from rolls 14 and 16 and wind up on rolls 15 and 17 respectively.

Fig. 2 also shows in block diagram a radio receiver 18 connected to antenna 19 and ground 20 feeding recording signals to lead 23 from point 22 and to leads 24, 25 and 26 from point 21.

Fig. 3 shows a modified form of the invention for making three simultaneous recordings of different subject matter. Signals bearing three independently modulated sub-carriers are received by receiver 18 connected to antenna 19 and ground 20. Amplified signals comprising three independent sub-carriers are fed from output terminals 27 and 28 of receiver 18 to rectifier-coupling tubes 29, 30 and 31 thru sub-carrier separating filters. Tube 29, including plate 32, control grid 33, and cathode 34 feeds linear electrode 6 by means of lead 24 connected to plate 32. The first sub-carrier is selected by means of the filter made up of shunt condensers 42 and 43, shunt resistor 41, series inductance 44 and series condenser 45 connected between terminal 27 on receiver 18 and control grid 33. In this way electrodes 6 and 8 record the modulations of the first sub-carrier on sheet 9.

In a similar manner, tube 30, including plate 35, control grid 36 and cathode 37 feeds linear

electrode 7 thru lead 25 connected to plate 35. The second sub-carrier is selected by means of filter 46—47—48—49—50 connected between terminal 27 and grid 38. Thus, electrodes 5 and 7 record a second and independent modulation upon sheet 10.

Likewise, tube 31 having electrodes 38, 39 and 40 feeds electrode 8 thru lead 27 connected to plate 35 and receives a third selected sub-carrier thru filter 51—52—53—54—55 connected to grid 39 and terminal 27. The third image, as represented by modulation of the third sub-carrier, is thus recorded by electrodes 5 and 8 on sheet 11.

Fig. 4 shows the development of drum 1 with its helical electrode 5 and indicating the positions of the three linear electrodes 6, 7 and 8. Along the sides of the developed drum 1 are shown degree indications marking various points of helix 5 in terms of angular degrees around the drum. Thus helix 5 extends once and a half or 540 degrees around drum 1. Linear electrodes 6, 7 and 8 are shown dotted at a point in the rotation of the drum 1 where each is starting the scanning of a line. This is accomplished by spacing the electrodes around the drum and by displacing them along the axis of the drum in echelon fashion by amounts proportional to the circumferential spacing. Thus electrode 7 is 90 degrees from electrode 6, electrode 8 is 90 degrees from electrode 7 and distance *ab* equals distance *bc*. It should be noted, as well, that helical electrode 5 extends beyond a complete 360 degrees by 180 degrees which is equal to the angular distance between electrode 6 and electrode 8. Many modifications are evidently possible while still keeping these general relationships.

It will be evident that many combinations are possible, as, for instance, two similar copies and a third dissimilar copy. Also, the phasing of all copies, whether alike or not, may be the same or may be made to differ by moving one or more of the linear electrodes along the axis of the drum.

While an electrolytic recorder has been described in particular, it will be evident that any method of recording in which linear and helical electrodes or printer elements may be used is anticipated by the present invention. The invention concerns the use and relation of more than one linear electrode with a common helical electrode regardless of the method of marking.

While only two forms of the present invention have been shown and described, it will be evident that many modifications are possible within the spirit and scope of the invention, as set forth in the appended claims.

What is claimed is:

1. A multiple copy facsimile recorder including in combination, a drum, a helical electrode carried by said drum, and a plurality of linear electrodes spaced around the circumference of said drum and displaced along the axis of said drum in echelon fashion for cooperating with said helical electrode to print substantially equally phased records on a plurality of record sheets.
2. A multiple copy facsimile recorder including in combination, a drum, a helical electrode extending more than once around said drum, and a plurality of linear electrodes spaced around said drum and proportionally displaced in echelon fashion along the axis of said drum for making substantially equally phased records on a plurality of recording sheets.
3. A multiple copy facsimile recorder including in combination, a drum, a helical electrode extending more than once around said drum, a plurality of linear electrodes around said drum and displaced in echelon fashion along the axis of said drum, and a source of recording signals connected between said linear electrodes and said helical electrode for making a plurality of similar records on a plurality of record sheets.
4. A multiple copy facsimile recorder including in combination, a drum, a helical electrode extending more than once around said drum, a plurality of linear electrodes spaced around said drum and displaced in echelon fashion along the axis of said drum, a source of a plurality of marking signals, means for separating said signals and means for applying each of said signals between one of said linear electrodes and said helical electrode for producing a plurality of different records on a corresponding number of record sheets.
5. A multiple copy facsimile recorder including in combination, a drum, a helical electrode extending more than once around said drum, a plurality of linear electrodes spaced around said drum and displaced in echelon fashion along the axis of said drum, a source of a plurality of independent marking signals, and means for applying each of said signals between one of said linear electrodes and said helical electrode for producing a plurality of different records on a corresponding number of record sheets.
6. A multiple copy facsimile recorder including in combination, a rotatable helical electrode, and a plurality of cooperative linear electrodes spaced around the circumference of said helix and displaced in echelon fashion along the axis of said helix for marking a plurality of record sheets in substantially the same phase.

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