Dec. 25, 1945. A. BLAIN 2,391,768

FACSIMILE RECORDER

Filed Jan. 30, 1941 2 Sheets-Sheet 1

Fig. 1.

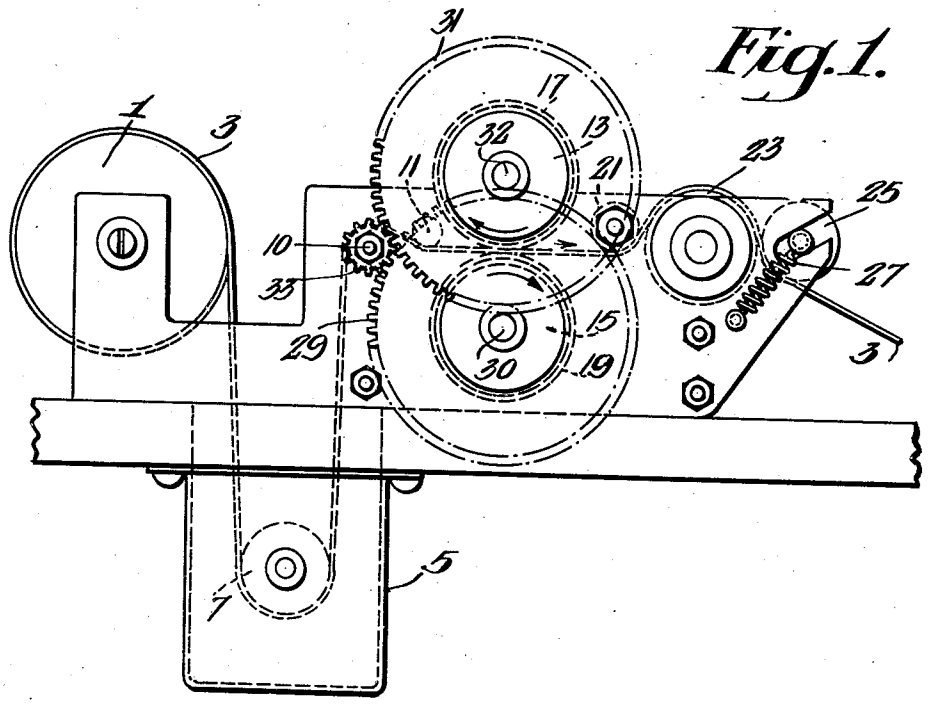
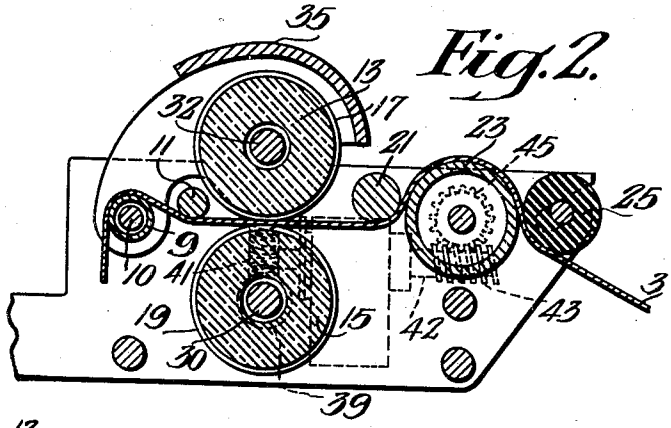


Fig. 2.



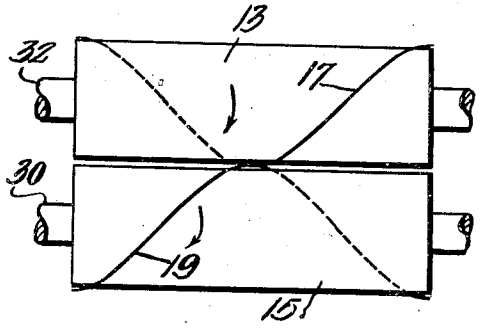


Fig. 3.

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Dec. 25, 1945. A. BLAIN 2,391,768

FACSIMILE RECORDER

Filed Jan. 30, 1941 2 Sheets-Sheet 2

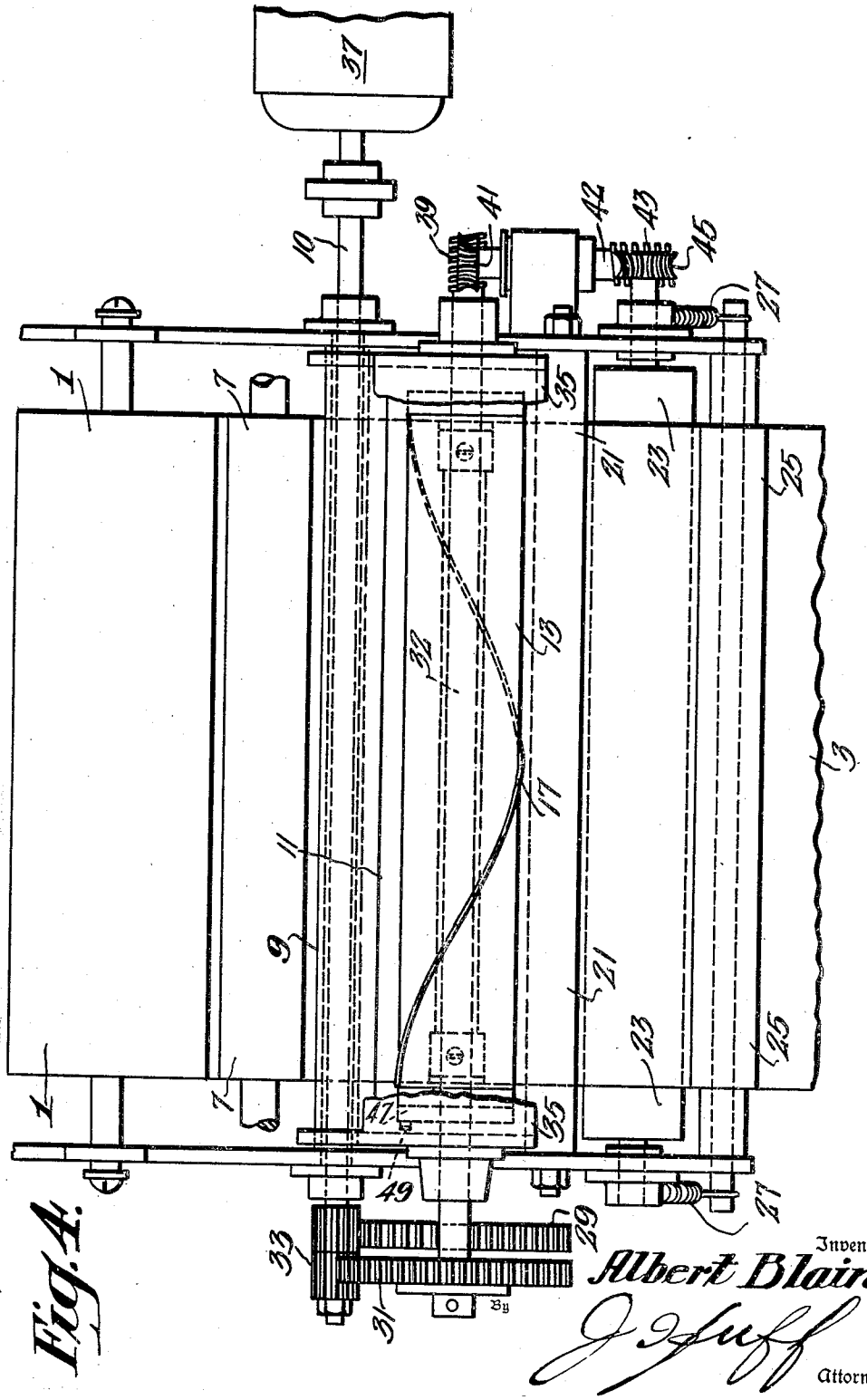


Fig. 4.

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UNITED STATES PATENT OFFICE

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FACSIMILE RECORDER

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Application January 30, 1941, Serial No. 376,615

2 Claims. (Cl. 234—68)

This invention relates to facsimile systems and more particularly to facsimile recorders.

In facsimile systems wherein a drum having a helical edge is adapted to rotate in synchronism with a drum supporting the record to be transmitted, the record may be reproduced on a record surface by causing the helical edge to act upon the surface in accordance with the signals received from the facsimile transmitter.

Heretofore, it has been the common practice to employ a drum having a helical edge in cooperation with a straight printer bar which is adapted to act upon the picture recording surface in accordance with the facsimile signal.

It is desirable to decrease the size of each recording spot in order that the detail of the recording may be improved. It may be said that the detail of the recording is very nearly inversely proportional to the longest dimension of each recording spot. In order to improve the detail of the picture, it therefore becomes necessary to decrease the longest dimension of the area of each recording spot.

It may be readily seen that the area of each recording spot in facsimile recorders employing a helical edge associated with a straight printer bar takes the form of a diamond rather than a small square or rectangle. It has been found that the area of the recording element may be made more nearly to approximate the shape of a square by increasing the diameter of a drum such that the angle of intersection between the helical edge and the printer bar is increased to approach 90°. It is, however, impossible to even theoretically provide a drum large enough that the angle of intersection between its helical edge and its associated printer bar will be 90°. Furthermore, there are disadvantages which accompany the increased diameter of the rotating drum. For example, the equipment is made bulky and the increased diameter increases the inertia of the rotating drum which makes it more difficult to keep the receiver drum in synchronism with a transmitter drum not particularly adapted to maintain a constant speed due to the nature of the equipment such as used in remote pickups.

Although this invention may be adapted for mechanical printing or printing on a record surface by mechanical pressure upon a transfer paper such as shown and described in the Young Reissue Patent 20,152, patented October 27, 1936, for the purpose of illustration a system of electrochemical recording has been adapted. It has hitherto been proposed to reproduce records by impregnating paper with a substance which will be discolored under the influence of an electric current and to apply this current at successive single small areas of the paper at a time, causing said area to progress systematically over the paper and so varying the current that, at each position of said area, it shall be proportional to the degree of darkening necessary to reproduce the record.

According to this invention, a pair of adjacent helical electrodes are adapted to revolve about parallel axes and intersect on a recording surface such that the angle of intersection between the helical electrodes is great and the area caused by the intersection takes the form of a square or small rectangle rather than a diamond, due to the large angle of intersection between the cooperating printing elements.

The primary object of this invention is to provide an improved facsimile recorder.

Another object of this invention is to improve the detail of the recording.

Another object of this invention is to decrease the area of the recording spot.

Another object is to decrease the diameter (and inertia) of helix drums, thus permitting better synchronizing control of the facsimile system.

Other and incidental objects of the invention will be apparent to those skilled in the art from a reading of the following specification considered in connection with the accompanying drawings in which

Figure 1 is an end view of a facsimile recorder,

Figure 2 is a sectional view of Figure 1,

Figure 3 is a front view showing the printer drums and helical electrodes, and

Figure 4 is a plane view of the facsimile recorder.

Referring now in more detail to Figure 1, a spool 1 carries a roll of paper or other recording surface 3 and is mounted at one end of the recorder. Below the spool 1, a tank 5 is provided with a guide roller 7 under which the paper 3 from the spool 1 is passed such that it will be immersed in the liquid in tank 5, which liquid is adapted to sensitize the paper 3 such that it will change its color upon the application of an electric current. This may be accomplished by the means and methods such as shown and described in Zworykin Patent 1,909,142, patented May 16, 1933.

The paper 3 then passes up and over a stationary guide tube 9 which is positioned around a shaft 10. It then passes under a guide rod 11 and between the drums 13 and 15. Drums 13 and 15 are composed of an insulating material. Drum

13 supports a spiral electrode 17 and drum 15 supports a spiral electrode 19.

The paper 3 passes under the guide rod 21 and over the drive roller 23 and between the drive roller 23 and the pressure roller 25. The roller 25 is forced against the drive roller 23 by the spring 27.

Drum 15 and gear 29 are mounted on shaft 30. Drum 13 and gear 31 are mounted on shaft 32. The gear 33, mounted on shaft 10, engages the gears 29 and 31.

Figure 2 shows a guard member 35 which covers the drum 13 whereby the spiral electrode 17 is guarded from mechanical damage and the operator is protected from receiving an electrical shock from the exposed and charged electrode 17.

Figure 3 shows a front view of the drums 13 and 15. The helical electrodes 17 and 19 are supported upon the surface of the drums 13 and 15, respectively. It will be noticed that the angle of intersection between the two helical electrodes is necessarily twice as great as it would be if one of the drums 13 or 15 were replaced by the customary printer bar. It is thus apparent that the area of intersection between the two helical electrodes 17 and 19 will cover a smaller area and the shape of the area will be more like that of a square rather than a diamond. Each helical electrode makes one complete revolution about its associated drum. The relative angular position of the drums 13 and 15 is adjusted such that the two helical electrodes will intersect.

Assuming the drums to rotate, as for example, in the directions indicated by the arrows, the point of contact between the two helical electrodes will move in the direction of the horizontal arrow (Figure 1). This movement will be from one end of the drums to the other end of the drums. As the point of intersection approaches one edge of the paper which is interposed between the printer drums, the electrodes will intersect again at the other edge of the paper.

If it is desired to have the drums rotate in opposite directions, it is necessary to have the spiral of one drum run in the opposite direction of the other.

Figure 4 shows the paper and the drum drive mechanism. A motor 37 which is kept in synchronism with the motor at the facsimile transmitter is mechanically coupled to the shaft 10 upon which is mounted the gear 33 of the well-known split gear type in order that the gear 33 may engage the gears 31 and 29 and allow the necessary adjustment of the relative angular position of the two drums. Gear 31 drives the upper drum 13 which contains the helix 17. The lower gear 29 drives the drum 15 which is fixed to a shaft 30 upon which is mounted a worm gear 39 which engages the gear 41 mounted on the shaft 42, containing the worm gear 43. The gear 43 engages a gear 45 on a shaft including the sheet drive roller 23.

As the paper is passed through the solution contained in tank 5, it is sensitized such that, if an electric current is passed therethrough, a mark will appear at the point of contact with the electrode charged positively with respect to its cooperating electrode. The paper thus sensitized passes between drums 13 and 15, rotating in directions shown by the arrows and at a predetermined rate. It is preferable that the drums rotate in the same directions so that the tension produced by the friction between one drum and the paper is opposite in direction to the tension upon the paper produced by the other drum. This allows the movement of the paper to be easily controlled by the drive roller 23.

A facsimile signal representative of the record to be made is applied to electrodes 17 and 19. The drum 13 contains a metallic slip ring 47 which is in contact with its associated electrode 17. Drum 15 has a similar slip ring, not shown. A terminal or brush 49 is adapted to engage the metallic ring 47 and is insulated from the frame such that a signal may be applied to the electrodes while the drums are rotating. The lower drum 15 has a similar brush cooperating with its slip ring.

A transmitter adapted to transmit such facsimile signals is shown and described in an article entitled, "Facsimile transmission and reception," by Maurice Artzt in the Electrical Engineers Handbook.

As the paper slowly moves between the rotating drums 13 and 15, the point of intersection between the paper and the electrodes 17 and 19 scans the paper from one side to the other side and forms a continuous image thereon. It follows that, as a signal is applied to the electrodes 17 and 19, there will be a record formed on the paper representative of a train of facsimile signals applied to the electrodes.

While one system for carrying this invention into effect has been indicated and described, it will be apparent to one skilled in the art that this invention is by no means limited to the particular organization shown and described, but that many modifications may be made without departing from the scope of this invention as set forth in the appended claims.

I claim as my invention:

1. In a facsimile recording system, the combination of a pair of adjacent helical electrodes adapted to rotate about parallel axes, means for applying a signal current to said electrodes, means for feeding a record receiving sheet between and in contact with adjacent points on said electrodes, and means for causing said electrodes to act upon said sheet in response to said signal current.

2. In a facsimile recorder, the combination of a pair of adjacent rotatable drums, a helical electrode on the surface of each of said drums, a slip ring at one end of each of said drums, a connection between said ring and its associated electrode, means for applying a signal current to said slip rings, and means for feeding a record receiving sheet between and in contact with adjacent points on said electrodes.

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