

July 11, 1933.

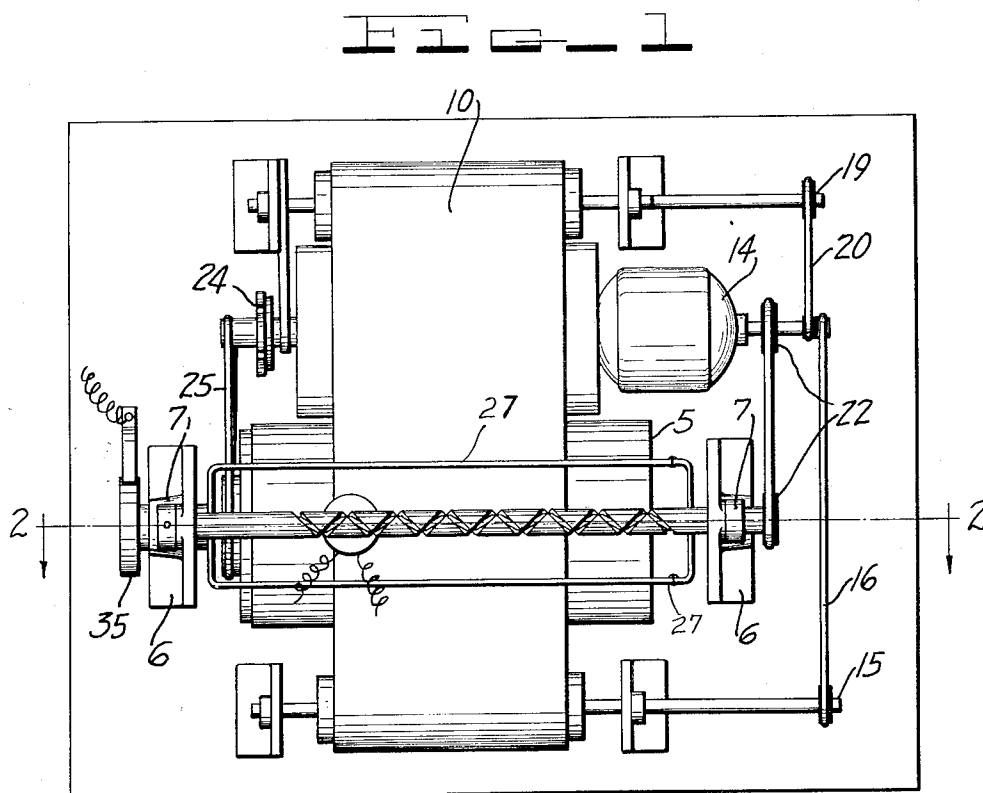
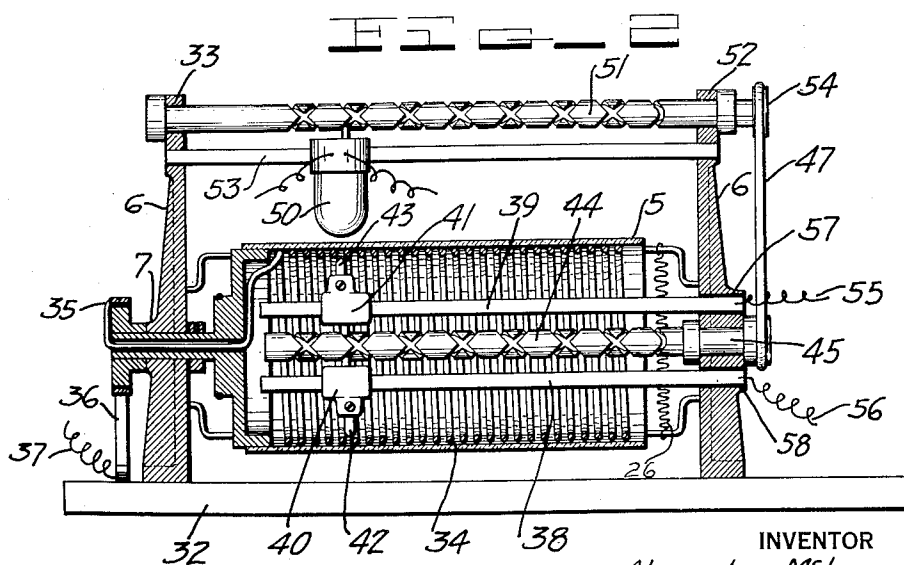
A. McL. NICOLSON

1,918,124

ARC SCANNING FACSIMILE SYSTEM

Filed Aug. 25, 1930

2 Sheets-Sheet 1



INVENTOR
Alexander McLean Nicolson.
BY *Jul R. Gosham*
ATTORNEY

July 11, 1933.

A. McL. NICOLSON

1,918,124

ARC SCANNING FACSIMILE SYSTEM

Filed Aug. 25, 1930

2 Sheets-Sheet 2

Fig. 3

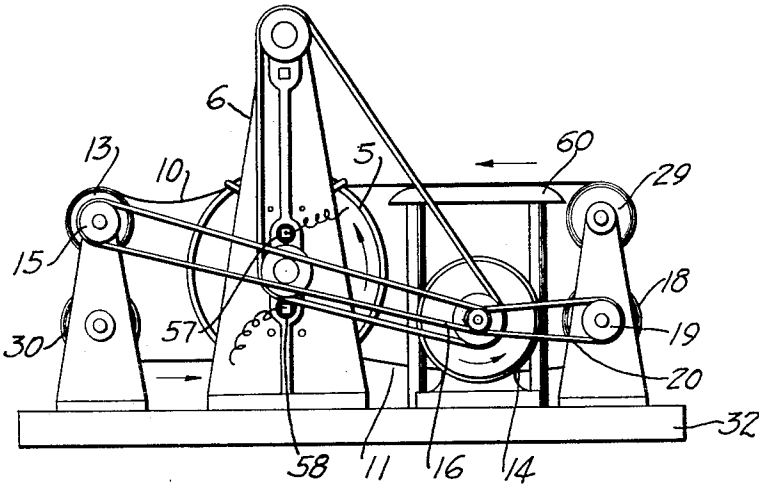


Fig. 4

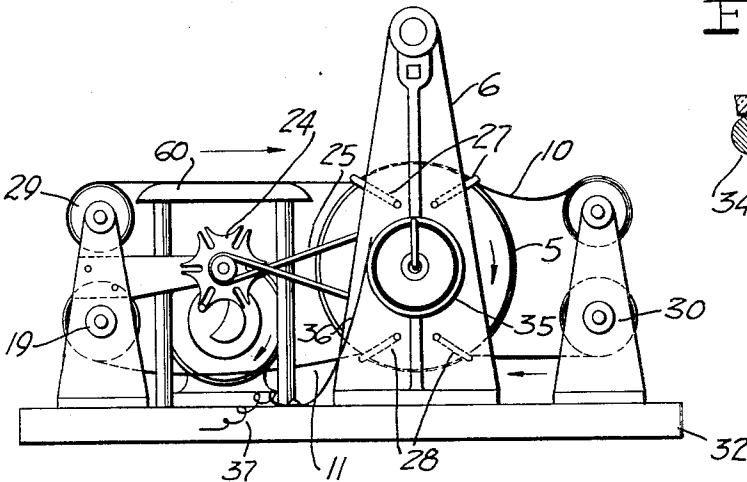


Fig. 5

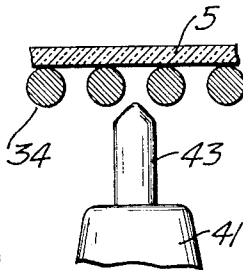
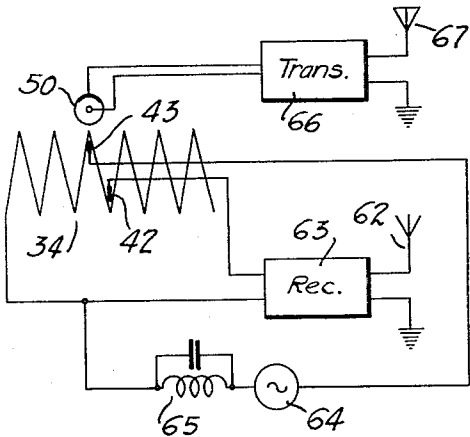


Fig. 6



INVENTOR
Alexander McLean Nicolson
BY *J. R. Goshaw*
ATTORNEY

UNITED STATES PATENT OFFICE

ALEXANDER McLEAN NICOLSON, OF NEW YORK, N. Y., ASSIGNOR TO COMMUNICATION PATENTS, INC., OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

ARC SCANNING FACSIMILE SYSTEM

Application filed August 25, 1930. Serial No. 477,534.

This invention relates to the transmission of copies of records or reproductions, and particularly to the transmission of facsimile messages, designs, drawings and the like.

An object of the invention is to electrically transmit information by the sense of sight.

Another object of the invention is to provide an efficient and simplified light source for facsimile transmissions.

Another object of the invention is to simultaneously transmit and receive electrically objects in the form of facsimiles.

The transmission of writing by telautograph systems is well known, but such transmission systems do not transmit exact copies of original messages, drawings and the like. However, it is well known in the art how to transmit photographic designs known in general as facsimile transmission systems. The present invention relates to the latter system, and is adapted to transmit such information in a more efficient manner than by systems now known in the art.

A special feature of the present invention is the method of obtaining a source of light and means of scanning information in the form of writing or drawings on paper. The source of light is in the form of an electric discharge or spark between two electrodes, one being a spiral shaped wire and positioned within a transparent cylindrical housing, and the other a pointed element positioned between turns and adapted to move transversely of the spiral when the spiral is rotated. With this arrangement light is projected between the turns of the spiral electrode, through the transparent housing and object thereon in the form of a writing, drawings, etc., to a photocell which follows the travel of the light source. Varying light densities of the message will be transformed into corresponding electrical variations which are transmitted to a receiving station.

The invention also contemplates two-way communication by written messages or the simultaneous transmission of a plurality of facsimiles. This is accomplished by the provision of two electrical sparks within the

transparent housing diametrically opposite one another, one light source serving as the constant transmitting source, and the other as the modulated receiving element. Both may be made constant, and when associated with two photocells, two facsimiles can be transmitted simultaneously.

The invention will be more fully understood from the following description with reference to the accompanying drawings, in which:

Figure 1 is a top view of the transmitting and receiving apparatus;

Fig. 2 is a cross sectional view of the apparatus of Fig. 1, taken along the line 2-2;

Figs. 3 and 4 are end views of the device;

Fig. 5 is an enlarged view of the electrode system employed in the system; and

Fig. 6 is a schematic diagram of the circuit arrangement employed.

Referring to the drawings wherein the same numerals identify the same elements of the system, a transparent or translucent cylindrical roller 5 is shown journaled in a frame 6 at 7. The paper on which a message or drawing to be transmitted is depicted, is carried over the roller on a belt 10, this belt being eliminated in case the medium on which the message is written is long enough to form a belt itself. Located on the lower side of the cylinder 5 is a second belt 11 which may carry sensitized paper or the sensitized paper may form the belt itself. The belt 10 is wound on a take-up roll 13 driven by a motor 14, through a pulley 15 and a drive belt 16. The belt 11 traveling in the opposite direction is taken up by a roller 18 driven through a pulley 19 and drive belt 20. The belts, of course, are driven or moved forward by the cylinder 5 which is driven by the motor 14 over the belt and pulley system 22. The motion imparted to the cylinder is intermittent or periodic, and is derived through a Geneva mechanism 24 driven by a belt 25. The transmission belts are guided over a definite portion of the cylinder 5 by means of clamps 27 for the belt 10, and clamps 28 for the belt 11, the clamps being tensioned in

position by a coil spring 26. These belts are fed from a roll 29 for the belt 10, and roll 30 for belt 11. The entire mechanism is mounted upon a bed plate 32.

5 The cylinder 5 is hollow and has mounted therein immediately adjacent its interior surface a spiral metallic electrode 34 which terminates at a slip ring 35. This electrode is connected to an external circuit through the
10 brush 36 and conductor 37. Also mounted within the cylinder 5 are two fixed square or rectangular rods 38 and 39 upon which are mounted two slidable electrode elements 40 and 41, respectively. These last mentioned
15 elements terminate in pointed electrodes 42 and 43 between which and the spiral electrode 34 an electrical discharge or spark is formed. The elements 41 and 42 are driven transversely of the cylinder by means of projections
20 meshing with a double spiral worm gear 44 which is adapted to rotate in a bearing 45, the worm being driven through a belt 47 from the motor 14. Upon the rotation of the worm 44, the elements 41 and 42 traverse the cylinder simultaneously in the same direction
25 and at the same speed. The arc formed between the electrodes 42, 43 and 34 is, therefore, made to traverse straight lines diametrically opposite one another across the cylinder. This angle of separation may be less
30 of course.

Following the movement of the electrodes 42 and 43 is a photoelectric cell 50 mounted upon a sliding bar 53, and driven from a
35 second worm 51 mounted in journals 52 and 33. Upon one end of the worm 51 is a pulley 54 which is driven by the belt 47 simultaneously with the worm 44. The photoelectric cell 50, therefore, is caused to traverse the
40 cylinder 5 with same speed and in the same direction as that of the electrical spark formed between the electrodes 43 and 34. Through the double worm thread, the moving elements will reverse their direction at
45 the ends of the cylinder. A potential is supplied to the electrodes 42 and 43 through the carrying rods 38 and 39 over conductors 55 and 56 which are insulated from the frame 6 with the insulations 57 and 58.

50 Referring to Fig. 5 it will be observed that the formation of an arc or spark between the electrodes 43 and 34 will project light between any two turns of the electrode 34 between which the electrode 43 is positioned
55 at the time. This light will be projected up through the transparent drum 5 and to the message, design or drawing being carried along by the cylinder 5 and belt 10. Light varying in accordance with the shades of
60 light and dark intensities of the message, will be projected through to the photoelectric cell 50 which will be energized accordingly. The arc formed by electrodes 43 and 34 is constant in intensity, while that between the
65 electrodes 42 and 34 will be varying in ac-

cordance with the light and dark intensities of a message being received.

As shown in Figs. 3 and 4 particularly, a stand 60 is employed over which the belt 11 passes. This is for the purpose of allowing
70 the writing of a message which is to be transmitted to a distant station upon paper or the belt itself. This message will be received upon the lower belt 11 on similar apparatus at the receiving station.
75

Referring particularly to Fig. 6 a receiving antenna 62 with a receiver 63 is shown supplying a potential to the arc formed by electrodes 42 and 34. The light produced
80 in this arc will vary in intensity in accordance with received signals characterized by the light variations of a transmitted message. The transmitting apparatus is not required to be as that shown in the present invention
85 to utilize the receiving system shown, but any modification thereof which scans in a similar manner may be used. With the present facsimile system reception and transmission is accomplished simultaneously. The
90 spark produced between electrodes 43 and 34 is the constant transmitting light source, and is supplied with potential from a source 64 which may be alternating in character and controlled by a smoothing circuit 65 to give
95 a more constant action. The photoelectric cell 50 is shown receiving the graduations in light intensities produced by the varying densities of the message being transmitted. The
100 output of this cell is sent into transmitting apparatus 66 which may be broadcast over antenna 67 or sent over wire systems in a manner well known in the art.

The operation of the system is extremely simple in that the belts 10 and 11 are moved
105 intermittently and maintained in a fixed position during the time the arc traverses the belts. Each movement of the roll moves the belts one scanning width, and the light sources then move in the reverse direction to the other end of the cylinder 5. Thus scanning
110 is accomplished in straight lines and each unit area of the message will be covered fully and completely. The spiral electrode 34 forms a shield to direct the projection of the light, the light beams overlapping a slight
115 amount. This overlapping causes a blending of the line scanning units so as to eliminate the joining line which is prominent in many facsimile transmission systems now known
120 in the art. This system is comparatively rapid in its action since the arc can be moved at a considerable rate across the paper. Furthermore, the rolls of this system may be continuous such that there is a return from the take
125 up roll to the supply roll or it may include double winding rolls wherein a new supply of copy may be inserted without interfering with the operation of the apparatus. The transmission of two way written messages as
130 in a telautograph system is accomplished

with the present invention, an exact copy of the message being receivable. The exact copy may be filed for record.

The invention has been shown in one of its preferred embodiments, but it is understood that there are equivalents which are within the scope of the appended claims.

What is claimed is:

1. In a transmission system having a light transmission medium adapted to support written intelligence, the combination of a source of light in the form of an electrical discharge, means for progressing said source over said written intelligence, said means having cooperating electrodes which direct light from said discharge over unit areas of said intelligence, one of said electrodes being spirally disposed adjacent said intelligence, and means for detecting variations in light and shade in said written intelligence.

2. In an electrical transmission system having written information to be transmitted and means for supporting said information, the combination of a pair of electrodes one of said electrodes being spirally disposed adjacent said information, means for producing an electric arc between said electrodes on one side of said support for scanning said information one of said electrodes confining the light from said arc to line sections of said information, and a photoelectric cell placed on the other side of said information for detecting and transforming the varying light transmissions therethrough into electrical variations.

3. In a facsimile transmitter having a light transmitting medium and written intelligence mounted on said medium, the combination of an electrode mounted within said light transmitting medium and spirally disposed along the length thereof, a second electrode adapted to progress along said first electrode, and means for supplying a potential difference to said electrodes to form an arc for scanning said written intelligence.

4. In a facsimile transmission system having a light transmitting medium adapted to rotate and information to be transmitted mounted on said medium and adapted to move therewith, the combination of a spiral electrode mounted within said medium and along the length thereof, a second electrode adapted to move longitudinally of said first electrode, means for supplying an electrical potential to said electrodes for producing an electrical discharge therebetween for scanning said information, and means for synchronizing the rotation of said medium with the transverse movement of said second electrode.

5. In a facsimile transmission system having a transparent cylindrical roller, the combination of an electrode mounted within said roller and adjacent the inside surface thereof, a second electrode adapted to trav-

erse said first electrode in said roller, means for applying written information on said roller to be scanned by a discharge between said electrodes, a third electrode mounted within said roller and associated with said first electrode, and means for applying a sensitized medium on said roller opposite said third electrode for scanning said sensitive medium by a discharge between said last mentioned electrodes.

6. In a facsimile transmission system having a hollow transparent roll, and means for rotating said roll, the combination of a belt contacting with said roll adapted to support written intelligence thereon, a second belt contacting with said roll supporting a light sensitive medium, means for carrying said belts, means synchronizing said roll with said carrying means for said belts, a plurality of electrodes, and means for producing a plurality of electrical discharges between said electrodes and internal of said roll for projecting light to said belts, one of said electrodes being common to all of said light discharges.

7. In a facsimile transmission system, a light transmitting medium adapted to rotate, means for mounting written intelligence on the surface of said roll, means for mounting a light sensitive medium on the surface of said roll, a plurality of electrodes, means for producing a plurality of electrical discharges between said electrodes within said light transmitting medium, one of said electrodes being spirally disposed and common to all of said discharges, and means for effecting simultaneous transmission and reception of written intelligence.

8. In a facsimile system, a combination of a plurality of electrodes, means for producing a plurality of electrical discharges between said electrodes, one of said electrodes being spirally disposed and common to all of said discharges, means for projecting light from one of said discharges to written intelligence to be transmitted, and means for varying the other of said discharges in accordance with electrical variations corresponding to written intelligence being received.

9. In a facsimile system having a roll for supporting written intelligence and a photocell for transforming light variations into electrical variations, the combination of a plurality of electrodes within said roll one of said electrodes being spirally disposed, and means for initiating an electrodynamic arc between said electrodes for scanning said intelligence one of said electrodes directing the light from said arc in unit areas over said intelligence.

10. In a facsimile transmission system having means for supporting written intelligence, the combination of a continuous electrode on one side of said support spirally

disposed therealong, a second electrode adjacent said first electrode adapted to move transversely of said first electrode, means for moving said second electrode transversely of said first electrode during rotation of said first electrode, and means for initiating an arc between said electrodes, the light from said arc being projected through the interstices of said first electrode for scanning said intelligence.

11. In a facsimile transmission system having a transparent medium, the combination of a continuous electrode mounted on one side of said medium and spatially disposed therealong, a second electrode mounted adjacent said first electrode and adapted to be moved transversely of said first electrode, means for moving said second electrode transversely of said first electrode during rotation of said first electrode, a third electrode adjacent said first electrode and adapted to be move transversely of said first electrode similarly to said second electrode, means for initiating electrical discharges between said first and second electrodes and between said first and third electrodes, and means for varying the voltage across one of said sets of electrodes.

12. In a facsimile transmission system, a transparent cylindrical roll, means for applying written information on said roll, means for applying a sensitized medium on

said roll in a position substantially diametrically opposite to said written information, a plurality of electrodes located within said transparent roll, one of said electrodes being spirally disposed along said roll, means for moving one of said electrodes transversely with respect to the other of said electrodes, means for initiating an arc between said electrodes, and means for varying the potential across the set of electrodes effecting the sensitized medium on said roll.

13. In a facsimile transmission system, a transparent support for written information, a belt for carrying said information, means over which said belt moves for applying said written information, a spirally arranged electrode on one side of said transparent support, a second electrode adapted to travel transversely of said first electrode, means for moving said second electrode transversely of said first electrode during rotation of said first electrode, and means for creating an electrical discharge between said electrodes for scanning said written information, the light from said arc being projected through the interstices of said spiral electrodes, said light paths overlapping.

Witness my hand this 20 day of August, 1930, at the city of New York, in the county of Essex, and State of New Jersey.

ALEXANDER McLEAN NICOLSON.

35

160

40

105

45

110

50

115

55

120

80

125

65

130