MESSAGE F16.1. AMPLIFIER 20 1 12 15 AMPLIKIER AMPLIFIER 10 F16.2. 22 23 PHUTUGRAPHIC RECURDER 33 420 AMPLIFICA AMPLIFIER 39 35 DUPLICATE CONTROL 29 31 32 4'rn AMPLIFIER 30

Jul. V

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This invention relates to a system for secretly communicating by means of facsimile transmission.

In other words, by means of my invention, a message in written, printed or picture form is transmitted, under the cambrel of a screen or cameuflage element, to another station at which the transmission is received and reproduced under the centrel of a deplicate of said screen or cameuflage element. These screens or cameuflage elements interrupt the transmission in an irregular or heterogeneous manner which renders interception of the transmission by unauthorised persons difficult, if not indeed impossible.

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Here specifically, it is an object of my invention to provide a faccimile transmission system having a transmitting means provided with a balanced bridge circuit. The message to be transmitted emmess variations in the flow of electricity in one branch of this bridge circuit. Any arbitrarily selected serves or countrel element emocon variations in another breach of Whitehridge circuit. These two breaches are enmosted tegether so that equal and epposite putantials are outsinlished across the circuit of an electric lamp whome subject therefore varies whenever the veltages of these two hyangles are not substantially equal. A bromomitter is neunted under the conjunt of the compat from said lamp. At the place to which it is desired to transmit the intuition gence, a reception means is hearted, provided with a several balanced bridge eiremit. A receiver in communication with anid brougalister cause variations in the flow of electricity to one bounds of the second bridge elevelt. A deplicate of endd edition or control elevent conces variations in conther bound of this second botique education these two beneater of this agreed bridge algorith are expansive inguithing

the circuits of an output electric law, whose output therefore varies whenever the output voltages of these branches of this second bridge circuit are not substantially equal. A light-sensitive element, such as a photographic film or the like, is located so as to receive and record the variations in the output of said output electric law in the form of a facei ile of the original message.

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For a further description of my invention reference may be had to the annaxed drawings and specification, at the end whereof the novel foutures of my invention will be specifically pointed out and claimed.

In the drawings, Figures 1 and 2 are circuit diagrams with parts shown as blocks and designated with appropriate labels.

In that embodiment of my invention selected from among others for illustration in the drawin, s and description in the specification, my device is shown as comprising an electric lamp 1 which serves as a source of light, the light being economizated by means of lens 2 upon the message sheet 5, which is to be transmitted. This message may be in an opaque form, such as on a sheet of paper, to reflect the light falling thereon, or in a transparent form, such as a film, to allow the light to pass therethrough. In either event, the reflected or transmitted beam of light, varied in accordance with the white and black particles of the message, falls on a light-consitive cell 4, such as a photo-clostric cell. Octil 4 is segmented as part of an amplifying circuit, generally indicated by block 5 cince any well-known type of amplifying circuit may be employed.

A count chestric large 4 forms a person course of light friend by a lane 7 take a been directed upon a serven of publish six chestral by which may be any artificantly extended pathons

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having relatively light and dark portions, such as a writing, print, drawing or random arrangement of dots.

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Relative metion is provided between lamp 1 and message 5 and between lamp 6 and control 8 so that the beam emitted by each of said lamps falls upon and seems the message and the control, respectively, in a manner well-known in the art of faccimile transmission.

The beam of light varied by control element & falls on a second light-sensitive cell connected as part of an amplifying circuit identified by the general reference character 10.

eppositely connected as the arms or branches 11 and 18 of a balanced bridge circuit having a diagonal or cross wire 18 connected to the terminals of a third electric lamp 16,, Amplifying circuits 5 and 10 have as their output a pulsating direct current of constant polarity and are connected so that equal and epposite potentials are established across lamp 14 by the signals transmitted under the control of message 5 and control 8. Lamp 14 is sensitised by a local battery 15 regulated by adjustable recistor 16.

Lone 17 concentrates the light from lasp 14 into a beam directed upon a third light-sensitive cell 18 forming part of a circuit including an amplifier 19, a transmitter 20, and an output element, such as an antenna 21, as shown, or the terminals of a wire transmission system.

At the location or place at which the message is to be received, there is provided a receiving member, such as antenna 22, as shown, or the opposite terminals of the wire transmission system. A receiver 25 with an amplifier has its output connected to a lamp 24 which is emergised by a local battery 25. Lens 26 concentrates the light from lamp 25 upon

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light-sensitive cell 27 forming part of a circuit including a third amplifier 27.

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An electric lamp 28 emits light which is beamed by lens 29 onto a screen or control element 30 which is a duplicate of control 8. Relative movement is provided between lamp 28 and duplicate control 30 so that exact synchronism is maintained between the scanning of controls 8 and 50. The light from source 28, reflected or transmitted by duplicate control 30, is passed to light-sensitive cell 31 forming a part of a circuit which also includes an amplifier 32. The output circuits 33 and 34 of amplifier circuits 27 and 32 are connected as arms or branches of a second balanced bridge circuit having a diagonal or crosswire 35 which connects to the terminals of a third output electric lamp 56 energised by local battery \$7 under the control of adjustable resistor 38. The light output of lamp 36 is collected by lens 39 and falls in a beam on recorder 40 which may be any light-sensitive device such as a photographic plate or film. Relative movement is maintained between lamp 36 and recorder 40 in exact synchronism with the relative movement between lamp 1 and message 3 so that recorder 40 reproduces identically the message 3 as varied by controls 8 and 30.

The operation of my device is as follows: Message 5 is scanned by the beam of light from lamp 1 and produces variations in this beam depending upon whether or not the portion of the message which intercepts the beam is black or white. These variations are transmitted by cell 4 and amplified in circuit 5. Control 8 varies the beam of light from source 6 and affects cell 9 and circuit 10 in the same way. Since the output voltages of circuits 5 and 10 are balanced against each other there is no change in the output of lamp 14 unless there is a difference between these output voltages in the arm or branch circuits 11 and

In other words, of the four possible conditions of message 3 and control 8, two conditions cause a variation in the output of lamp 14 and two conditions cause no variation in the output 125 of lamp 14. The conditions which cause a variation are when the spot of message 3 on which the beam of light falls is black or white and the simultaneously exposed spot of control 8 is the reverse. The conditions which cause no variation are when the simultaneously exposed spots of message 3 and control 8 are 130 of the same hue. The variations in the intensity of the light emitted by lamp 14 cause pulses or oscillations in the circuit containing amplifier 19 and transmitter 20. These pulses or oscillations are sent to receiver 23, where they cause corresponding variations in the light emitted by output lamp 24 and, 135 therefore, in the output of the circuit containing the third amplifier 27. Simultaneously with the scanning of control 8, duplicate control 30 causes variations of the beam of light from source 28, which variations actuate cell 51 and appear in the output circuit 34 of the circuit containing the fourth 140 amplifier 32. Lamp 36 is mounted across the output circuits 35 and 34 of the circuits containing third amplifier 47 and fourth amplifier 32 respectively. Because the voltages of output circuits 55 and 34 are equal and opposed, the light emitted by lamp 36 only varies when two of the four possible 145 conditions exist. That is to say, when there is present in output circuit 35 a pulse corresponding to either a black or a white spot in the original message 5 and there is simultaneously present in output circuit 34 a pulse corresponding to a spot of the epposite hue in the duplicate control 30, a variation in the 150 light output of lamp \$6 occurs. Conversely when the simultaneous impulses present in the output circuits 55 and 54 correspond to spets of like hue in message 5 and duplicate central 50, mo

variation happens in the output of output lamp 36. These variations of the output of the light from lamp 36 sensitise the phitographic element 40, spot by spot as the element is scanned, and thus reproduce the original message 3.

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We do not intend to be limited save as the scope of the attached claims may require.

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- heans for secretly transmitting pictorial information, said means comprising, a scanner arranged to scan and reproduce a pictorial message as a series of electric impulses of varying intensity, a screen having varying portions, a second scamer 5 arranged to soan and reproduce the variations of said screen as a second stries of electric impulses of varying intensity, an electric light connected across the output circuits of said scanners so that its output varies in intensity when the potentials across said output circuits are not equal, a photo-electric 10 cell mounted so as to wary in response to the output of said light, a transmitter sommested to emit signals in accordance with the variations of said photo-electric cell, a receiver arranged to receive the signals emitted by said transmitter and having an output potential varying in accordance with said signals, 15 a second screen duplicating said first mentioned screen, a second receiver having an output potential varying under the control of said second screen, another electric light connected across the sutput circuits of said receivers so that its output varies in intensity when the potentials across said output circuits are 20 not equal, and a light-sensitive element mounted so as to be seamed and to record the variations in intensity of said other light and to thereby receive the message.
 - 2. Means for secretly transmitting pictorial information, said means comprising, a seamor arranged to some and reproduce a pictorial message as a series of electric impulses of varying intensity, a seroom having varying pertions, a second sommer arranged to seen and reproduce the variations of said seroon

as a second series of electric impulses of warying intensity, an electric light connected across the output circuits of said scanners so that its output varies in intensity when the potentials across said output circuits are not equal, a photoelectric cell mounted so as to vary in response to the output of said light, a transmitter connected to emit signals in accordance with the variations of said photo-electric cell, a receiver arranged to receive the signals emitted by said transmitter, a second electric light connected to said receiver so that its output varies in intensity in accordance with the signals received of said receiver, an amplifier circuit including a second photo-electric cell mounted so as to wary in response to the output potential varying in accordance with said signals, a second screen duplicating said first mentioned screen, a second receiver having an output potential varying under the control of said second screen, a third electric light connected across the output circuits of said receivers so that its output varies in intensity when the petentials across said output eircuite are not equal, and a light-sensitive element mounted so as te record the wariations in intensity of said third light and to thereby receive the message.

S. A transmitting and receiving system for secretly semmunicating messages in pictured form in which there is provided, a first electric circuit constructed so as to emit a direct current voltage which varies in response to the variations in light transmission of a sheet on which the message is, a control element having portions of varying light transmitting observatoristics, a second electric strong to constructed so as to emit a direct current voltage which varies in response to the variations in light transmission of said control element, a transmitter mounted under the control of said circuits so

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that the transmitter only emits a signal when the output voltage of one of said circuits differs from that of the other, a receiver tuned to respond to signals emitted by said tramemitter and to provide an output varying with said signals, a second control element substantially identical to the first mentioned control element, a third electric circuit constructed so as to emit a direct current voltage which varies in response to the variations in light transmission of said second central element, a light emitter mounted under the control of said receiver and of said third electric circuit and arranged so that the light emitted thereby varies only when the voltage output of said receiver differs from that of said third circuit, and a recording device located so as to record the variations of the light emitted by said emitter and thus to reproduce the message.

In a secret communication system by means of facsimile transmission, a balanced bridge circuit having an output element supplying an output varying in response to the output of an amplifying circuit controlled by the message to be sent and to the output of a seeded amplifying circuit controlled by a screen, the outputs of said amplifying circuits being balanced against each other so that there is no output from said bridge circuit except when there is a difference between the outputs of said amplifying circuits, a transmitter having an output element supplying an output varying in response to the output from said bridge circuit, a second balanced bridge circuit having an output element supplying an output varying in response to the output of a third amplifying circuit controlled by a receiver controlled in turn by the receipt of the output from said transmitter and to the output of a fourth amplifying circuit controlled by a duplicate of said screen, the outputs of said third and fourth amplifying circuits, being balanced against each other so that there is no output from said second bridge circuit except when there is a difference between the outputs of said third and fourth amplifying circuits, and a recorder responsive to the output of said second bridge sircuit to furnish a facsimile of said message.

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A system for secret ecumunication comprising, a source arranged to emit a beam of light, a message legated so as to vary said beam of light from said source, a light-sensitive sell arranged to receive said beam of light from said source as varied by said message, an amplifying circuit including said cell, a second source arranged to emit a beam of light, a screen located so as to vary said beam of light from said second source, a second light-sensitive cell arranged to receive said beam of light fro said second source as varied by said screen, a second amplifying circuit including said second cell, a lamp connected across the outputs of said amplifying circuits so that the light emitted thereby varies when there is a difference between the outputs of said am lifying circuits, a third light-sensitive cell arranged to receive light from said lamp and to cause variations in consonence with the variations in said light, a transmitter connected in circuit under the control of said third cell so as to vary its transmission in consonance with the variations effected by said third cell, a receiver in communication with said transmitter, a second lamp connected to wary in consonance with the variations in output of said receiver, a fourth light-sensitive cell arranged to receive light from said second lamp, a third emplifying circuit including said fourth cell, a third source arranged to emit a beam of light, a duplicate screen located so as to wary said beam of light from said third source as varied by said duplicate screen, a fourth amplifying circuit including said fourth cell, a third lamp connected across the outputs of said third and fourth amplifying circuits so that the light emitted thereby varies when there is a difference between the outputs of said third and fourth amplifying circuits, and a light-sensitive device arranged to receive light from said third lamp and to record the variations of said light in the form of the original