

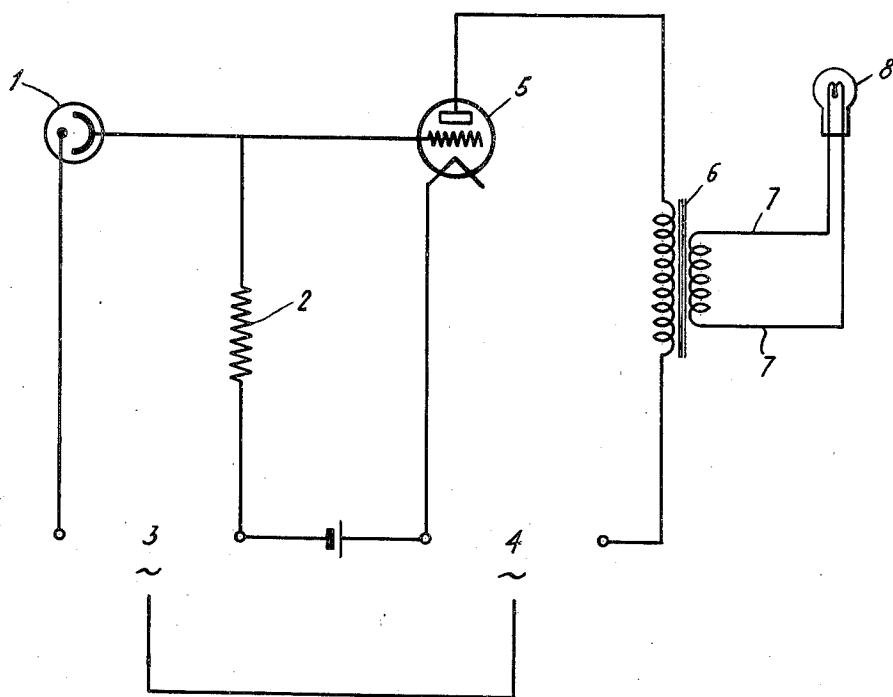
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PICTURE TRANSMISSION SYSTEM

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PICTURE TRANSMISSION SYSTEM

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1 Claim. (Cl. 178—6)

The invention is concerned with means adapted to electric picture transmission, so-called picture telegraphy, in which the scanning surface and the picture re-creation surface consist of a plurality of similar cells, each of the latter corresponding to a picture elementary area or unit, and in which therefore the excitation and the control of all of these constituent cells is effected simultaneously. Each photoelectric cell of the scanning surface on which the picture is to be transmitted is projected, is united through an independent electric transmission channel with the luminous cell coordinated and congruous thereto in the re-creation board or surface. Means of this kind are fundamentally known in the television arts. They have of late been utilized for visualizing moving pictures on an enlarged scale over short distances, that is to say, through short connecting lines. For this purpose, for moderately satisfactory transmission, at least 5000 individual cells are required, while for severer demands 10,000 or more cells are needed.

Tests have shown that the photoelectric control of the luminous cells constituting the re-creating board or surface is feasible in an economic manner with the means nowadays available. The constituent transmission channel consists of the photoelectric scanning cell or pickup cell, preferably one of the Elster and Geitel pattern; furthermore, a coupling resistance connected in series with said cell which is inserted between the grid and the cathode of an amplifier tube, the amplifier tube properly so-called, and the light cell connected in the plate circuit of the said amplifier tube, said cell being in the form of an incandescent electric lamp with a slender filament of sufficiently high ohmage and low thermal inertia, a television glow-lamp, or else a tube furnished with a fluorescent screen caused to luminesce by virtue of impacting electrons.

Now, while the designing and the dimensioning of the said parts neither offers any unusual difficulties nor any unduly great expenditure and outlay of means or money, it has been found that the supply with current of the whole equipment is the most serious practical problem to be solved. Indeed, this will be readily understood if it is remembered that the current requirements of a single transmission channel must be multiplied by 5000 or more for the whole outfit. Since the electric supply consists mostly of a single phase or a three phase supply line, the operating mode heretofore suggested involves a great deal

of equipment for conversion and rectification of the A. C., particularly also for the smoothing of the rectified current which constitutes a large aggregate current. When it comes to such large energy volumes, the efficiency of the supply plays a considerable part.

Now, the simplification and the reduction in cost of the current supply is the object of this invention. The same is predicated upon this consideration that in multi-cell transmission schemes as hereinbefore outlined the highest frequency of luminosity variations of the picture element, even with the most rapid variations of fluctuations in the original picture remains considerably below 50 cps. In the presence of a variation frequency of 50 cps. the eye proves entirely sluggish, in other words, the eye does not perceive any flicker, in fact, it senses or registers only the constant average value of illumination. On the basis of this fact it is possible to directly utilize the normal sph or 3ph current of 50 cycles or over for the operation of the constituent channels. Introducing the supply line alternating voltage in the plate circuit of the amplifier tubes (or if it be used even in the photoelectric cells), it will form, by that its amplitude is modulated by the photoelectric effect of the original picture, the carrier frequency of the picture impulses. Another advantage of such a carrier frequency method resides in the possibility of any desired voltage transformation somewhere along the transmission for the purpose of adaptation. For instance, the high resistance of the amplifier tubes may be adapted to the low resistance of the connecting wires brought to the luminous cells or of the latter themselves.

By virtue of the possibility of connecting all of the amplifier tubes as well as all of the photocells directly or merely through a voltage transformer with the available sph or 3ph supply network according to the invention, both the design and construction as well as the attendance and operation of the current supply means are considerably simplified. Where especially high grade picture transmission and more particularly where very great luminous densities are concerned and demanded, a carrier wave of 50 cps. might appear somewhat too low. But in such cases the network frequency may be suitably doubled to 100 cps. by rectifier schemes of a kind known in the prior art. The merits of the invention will then be still preserved in that the expensive smoothing and filter means for the pulsating rectified current may be dispensed

with, while the chance of carrier current transmission and provision of voltage transformers is yet possible.

One embodiment of the invention is shown by way of example in the drawing. In the scheme here shown both the plate circuit of the amplifier tube as well as the circuit of the photoelectric cell are supplied with the alternating voltage of the supply line, if necessary, after transformation to the desired values of voltage. It will be understood that only the amplifier tubes could be fed with the supply line voltage while for the photoelectric cells, which, as will be remembered, require but comparatively low currents, the usual direct current voltage supply is preserved. Another scheme would be to supply the photocells with D. C. voltage and an additional superposed alternating voltage obtained from the supply line, the positive alternations added to the D. C. voltage then acting as positive or anode (suction) potentials.

Referring to the drawing, 1 denotes the photoelectric cell, 2 the coupling resistance which is inserted between the control grid and the filament of the amplifier tube 5. 3 and 4 are the terminals upon which the alternating potential of the supply line is impressed in the proper phase relation. 6 is the output transformer adapted to step down the plate alternating voltage for the glow lamp circuit 7, 8. The lines 9 are the connection between the scanning board and the picture re-creating board, and they may be of a length so that the time constant resulting from its R and C and the control responsiveness of the luminous cell will be limited. As stated before, in lieu of the incandescent lamp 8, also a glow-discharge (television lamp) or a fluorescent lamp could be employed, the latter suitably being merely controlled or modulated by the alternating impulses amplified by the tube 5 (by means of grid), whereas the luminous energy is supplied to the electrons from the local plate circuit, also in the form of supply line voltage.

As has herein before been stated, this device is adaptable for use with the ordinary current supply circuits such, for instance, as used or supplied by power companies. It will be noted from

the drawing that the supply is adapted to be impressed directly onto the photocell 1 and onto the vacuum tube 5 in correct phase relationship. Now, on the positive half of the cycle, the photocell will be energized and the vacuum tube will be in a conducting state, and the output of the vacuum tube will depend in amplitude upon the grid voltage of the tube which will be of a value dependent upon the potential drop across resistor 2 due to the photocell currents. Now, on the negative half of the cycle, the vacuum tube 5 will be blocked and there will be no current flow, but due to the pulsating currents formed during the positive half of the cycle, the secondary of transformer 6 will have impressed thereon an alternating current due to well known self-inductive phenomena taking place in the primary circuit and the amplitude of the alternating current will be proportional to the current flow during a positive half of the cycle, and hence may be said to be amplitude modulated.

Having now described the invention, what I claim and desire to secure by Letters Patent is the following:

In a light intensity modulation system, a photoelectric element, means for energizing said photoelectric element directly from a source of alternating current of low frequency, means for supplying light of varying values of intensity to the photoelectric element, a resistance joined to said photoelectric element across which variations in potential are developed in accordance with varying values of light supplied to said element, an amplifier for amplifying the potential variations across the resistance, means for energizing the output circuit of said amplifier entirely from the above mentioned alternating current source in such phase relation that amplitude modulation of the alternating current in accordance with the potential variations across the resistance is accomplished, a light producing element, and a transformer in the output circuit of said amplifier, the secondary of said transformer being electrically connected to the light producing element whereby light of an intensity which varies in accordance with the modulation of the alternating current source is produced.

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