

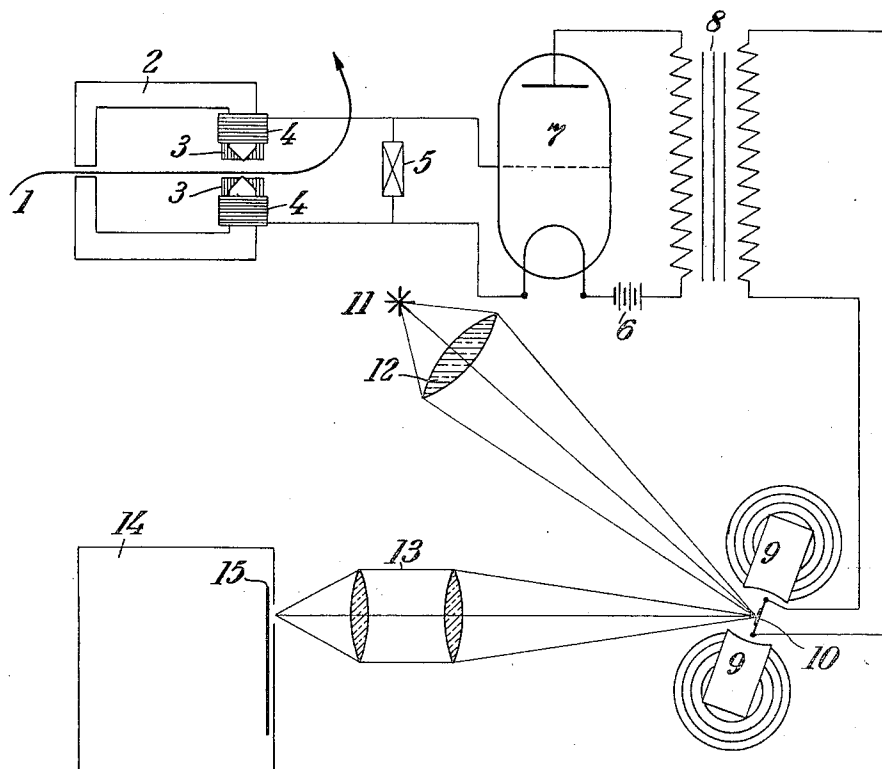
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MANUFACTURE OF SOUND RECORDS

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MANUFACTURE OF SOUND RECORDS

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6 Claims. (Cl. 179—100.2)

My present invention relates to the manufacture of sound records and more particularly to the production of talking motion picture films.

It is a continuation in part of my application Serial No. 479,797 for Non-grained sound film, filed September 4, 1930.

One of its objects is to provide a process for producing sound records on a photographic film provided with a grainless or finest grained light sensitive layer. Additional objects of my invention are the films bearing a sound record in a finest grained or grainless layer. Further objects will be seen from the detailed specification following hereafter.

Reference is made to the accompanying drawing illustrating diagrammatically the production of a talking motion picture film according to my invention.

In order to obtain a perfectly satisfactory record of sounds, it is necessary to register as wide a range of frequency as possible. A process must, therefore, be selected which operates with the least possible inertia. Of the known processes, the magnetic record is preferred for this reason to the mechanical and photo-electric processes.

The magnetic process was formerly only used to a limited extent, because the magnetic records on the steel wires or strips were not very durable and, therefore, could only be manipulated under special precautions, quite apart from the high costs of the material which is needed in five to ten times greater quantity than positive film. Furthermore the said records require for the reproduction of sounds a speed of about 2 to 3 meters per second only difficultly to be realized under the conditions usual in practice. In order to avoid these disadvantages it is necessary to transfer the magnetic indications photo-electrically by the transverse or intensity processes into sound impressions on a photographic film. It was found that ordinary negative film is not appropriated because the definition of the records was impaired on account of the coarseness of the grains and that the optical registrations only reproduced a small range of frequencies. It has already been proposed for the direct photographic production of sound records to employ emulsion layers having smaller grains than the usual negative films, but a smaller grain than that of normal positive films could not formerly be employed for directly recording because, by reducing the size of the grains, the sensitiveness of the photographic film was considerably reduced.

Now, I have found that these grainless or very finely grained emulsion layers yield perfectly satisfactory results by an indirect recording process, namely by transferring photo-electrically the prime master sound record obtained by the magnetic process operating without inertia onto such photographic layers, preferably according to the variable area method.

For the intermediate magnetic record, instead of a steel wire or perforated steel strip of about 0.015–0.100 mm. thickness usually employed at the present time, according to my invention thin magnetizable layers are used. Such coatings are deposited as a magnetizable coherent electrolytic layer or sprayed according to Schoop's process, or coatings of magnetizable powder with binding materials are applied on one or both sides to a perforated strip of celluloid, regenerated cellulose, paper, aluminium, copper etc. For the highest working efficiency the layers are polarized before receiving the record. The pole shoes of the magnets have 0.05–0.1 mm. thickness, are formed as knife edges, surrounded by a copper envelope and consisting of a material having the least possible remanent magnetic property, and extend over the whole breadth of the strip or surround it on both sides. The speed of the sound carrier is while taking at the same time a magnetic record and a motion picture, preferably, several times greater than that of the picture film.

The photographic transference of the magnetic film can be effected very considerably more slowly (10 to 100 times) than the magnetic recording if the electric currents produced in the receiving magnets and, if necessary, amplified, are transferred to one or more of the instruments usual at the present time for the direct recording of sounds such as oscillographs, moving coil or thread galvanometers, cathode ray oscillographs for transverse records, a glow or other lamp for the intensity method.

My present invention is based on the recognition that only these highly sensitive apparatus, having very little or no inertia, effect the indirect record of high frequencies in a perfectly satisfactory manner. In devices by which simple optical shutters are controlled, the transmission must be effected extremely slowly on account of their great inertia; but the lower the speed, the less are also the currents induced by the magnetic film, so that a relatively strong amplification with all its associated disadvantages is necessary. On the other hand, by using the apparatus usually employed in direct photographic recording of sounds, a moderate amplification is

sufficient if, to maintain the purity of the tones, the original magnetic record is taken on the finest magnetizable wires or films.

In order that the invention may be more clearly understood and readily carried into effect the same will now be more fully explained with reference to the accompanying drawing:

The steel wire 1 bearing a magnetic sound record or a perforated band of magnetizable material bearing a sound record is slowly advanced through a hole in the electromagnet 2 and passed between the poles 3 provided with a copper mantle. The undulating electric currents induced in the solenoids 4 are amplified if necessary by means of the electronic valve 7 connected with the rheostat 5, battery 6 and transformer 8 and then pass a wire frame bearing the mirror 10 arranged between the poles 9 of a galvanometer, thus causing an oscillation of the mirror. The image of a source of light 11 is projected by the lens 12 onto the mirror 10 and reflected by the same through a lens system 13 and a slit in the box 14 on the light-sensitive film band 15.

The figure illustrates the production of a variable area sound record with the aid of an oscillograph on the margin of a photographic film formerly exposed under the corresponding positive picture film. Of course the latent sound image may also first be taken on the margin of a film and the film thereafter be exposed under the positive of a picture film or under a reversed negative film. The picture and sound records are then developed simultaneously whereby the negative of a motion picture film is obtained serving for the production of copies.

The magnetic sound film is photographically transferred to grainless or finest grained silver halide emulsion layers, which are made highly sensitive by hyper or ultra sensitizing according to known methods by using ammonia and dissolved silver salts or hydrogen peroxide, with the addition of sensitizing dyes, such as isocyanines, eosine dyes or the dye registered under the trade name of "Pinaflavol". The negative sound film obtained according to the invention is, on account of the necessary sensitizing, usually not absolutely grainless, but the size of the grains can be between 0.1-0.5 microns.

In this manner sound records are obtained which, on account of the light power of the grainless or finely grained emulsions photosensitized by dyestuffs, record oscillations of a sufficiently great range of frequency to enable a perfectly satisfactory reproduction of the sounds.

The sound film negative obtained according to my invention may be printed by contact or pro-

jection onto films provided with a similar grainless or finest grained silver halide emulsion layer sensitized by the methods already described or by means of diazo-compounds, leuco-bases of dyestuffs, halogenated dehydro-indigo-compounds, derivatives of o-nitro-benzaldehydes, condensation products of p-nitrosoanilin with hydroxylamino, nitroso-naphthylhydroxylammonium or the like. Sensitive resinous films likewise may be employed. These films also give copies which possess, in consequence of their absence of grain, large resolving power.

What I claim is:—

1. In the manufacture of sound records and sound motion picture films the method of providing a photographic sound record which comprises transforming sound waves into electrical impulses, registering said electrical impulses magnetically, and transferring the magnetic sound record photo-electrically onto a photographic film having a silver halide emulsion layer of finest grain highly photo-sensitized with dyestuffs.

2. In the manufacture of sound records and sound motion picture films the method of providing a photographic sound record which comprises transforming sound waves into electrical impulses, registering said electrical impulses magnetically, and transferring the magnetic sound record photo-electrically onto a photographic film having a silver halide emulsion layer of a grain size of about 0.1 to 0.5 micron highly photosensitized with dyestuffs.

3. In the manufacture of sound records and sound motion picture films the method of providing a photographic sound record which comprises transforming sound waves into electrical impulses, registering said electrical impulses magnetically, and transferring the magnetic sound record photo-electrically onto a photographic film having a silver halide emulsion layer of a grain size below 0.1 micron highly photosensitized with dyestuffs.

4. A film for use in sound recording which comprises a fine grained and highly photo-sensitized photographic layer the size of the grains of said layer being about 0.1 to 0.5 microns.

5. A film for use in sound recording which comprises a fine grained and highly photo-sensitized photographic layer the size of the grains of said layer being below 0.1 micron.

6. A film for use in sound recording which comprises a practically grainless photographic layer highly photo-sensitized.

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