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## (54) SYSTEM FOR RECORDING SIGNALS

(71) We, ALLGEMEINE ELEKTRICITÄTS-GESELLSCHAFT AEG-TELEFUNKEN of Hohenzollerndamm 150, 1000 Berlin 33, Federal Republic of Germany, a German Body Corporate, and TELDEC TELEFUNKEN-DECCA SCHALLPLATTEN G.M.B.H., of Heussweg 25, Hamburg 19, Federal Republic of Germany, a German Body Corporate, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a record carrier for stored signals. It also relates to a method of recording signals on a record carrier and to a method of producing a record carrier having signals stored therein.

This application is divided out of our co-pending application No. 7623/69 (Serial No. 1,266,202).

In a known method of reproducing signals which are stored in the form of deformations in the surface of a physical medium, for example in the form of a hill-and-dale or lateral recording in a groove, the mass of the portion of the pickup which is substantially rigidly connected to the pickup tip so as to oscillate therewith, is selected so small, using a resilient restoring means which has as low a force as possible but adequate while being sufficient to restore the pickup to a central position, that the natural resonance of this movable part lies above the range of signal frequencies used. Generally, a spring determines the restoring force or its reciprocal value (the flexibility or compliance of the pickup), and acts immediately between the part which is connected substantially rigidly to the pick-up tip so as to vibrate therewith, that is to say generally the pickup needle with its holding member, and the electromechanical transducer, for example a piezo-electric crystal.

According to known and widely used principles, care is taken to ensure that, assuming conventional groove dimensions and radii of curvature of the pick-up tip, the resulting reduction in the amplitude of modulation resulting from elastic and permanent deformation of the material of the medium remains small in comparison with the spatial recording amplitude present. Otherwise, there would be a reduction in the signal level and distortion in the reproduction.

These interrelations lead to recognition of the fact that the elastic and permanent deformation to which the material of the medium is subjected under the pressure of the pickup tip imposes upper frequency limits on the mechanical playing back of grooved recordings, the limit being derived from the dimensions of the co-operating surfaces of the pickup tip and the medium, the strength characteristics of the material of the medium and the relative velocity between pickup and groove surface as well as the pressure loading the pickup tip, and is not far above the range of signal frequencies to be reproduced in the conventional gramophone-record reproduction art based on a grooved disc.

The publication "Factors Affecting the Stylus/Groove Relationship in Photograph Playback Systems" by G. R. Bastiaans in Journal of the Audio Engineering Society, October 1967, Volume 15, No. 4, pages 389 to 399 contains a detailed exposition of the theory of these relationships from which it derives values of the limiting frequencies which cannot be exceeded for the types of gramophone record in current use. Results of measurements confirm the knowledge gained from the theory. As an expedient for reducing the disturbing effect of the flexibility of the material, it is recommended therein that a material having a higher modulus of elasticity, that is to say harder material, should be used. The author recognises, however, that with such a material, the pressure per unit of area leads to permanent deformation because

of the reduced contact area (for example with nickel as medium) so that rapid wear results. In order to increase the width of the frequency band which can be used, particularly its extension towards higher frequencies, the only possibility, according to this publication, is the use of a very much lower pickup stylus force although this would only be possible with a simultaneous considerable reduction in the mass of the moving parts of the pickup. In addition, it would be important to find a material for the recording medium which was very hard and had a high elastic limit in order to keep the deformation of the walls of the grooves very low and to maintain such deformation within the elastic range.

This view of development possibilities is based entirely on the assumption that the disadvantages observed in mechanical reproduction, which lead to a lack of the pickup signal at a limiting frequency not far above the range of frequencies used at present, can only be reduced by keeping the "interference" low, namely the deformation of the material of the medium. It is clear that this is not a very promising method and moreover it is one which can only bring gradual improvements which are very small measured against the expense. The findings of this publication, which are typical of the generally recognised teaching of those skilled in the art, mean nothing more than that an upper frequency limit is imposed on mechanical reproduction and—because of the inevitable flexibility of the material of the medium—can only be displaced but not overcome.

The invention is based on the idea that, in contrast to the conventional view of those skilled in the art, a broader frequency range of mechanical reproduction can be realised and can include frequencies above the previously recognised limiting value.

According to a first aspect of the invention, there is provided a record carrier having stored signals recorded therein comprising a carrier body, a plurality of elastically compressible surface features on the carrier body, which features vary in dependence on the characteristics of the stored signal, the surface features being adapted, when traversed by a pickup capable of compressing the surface features, to exert variations in pressure on the pickup from which pressure variations playback signals corresponding to the stored signals can be derived.

According to a second aspect of the invention, there is provided a method of recording signals on a record carrier comprising converting the signal to be recorded into mechanical vibrations and impressing these mechanical vibrations on to a carrier body in the form of elastically compressible surface features which vary in dependence on the characteristics of the signal to be stored, these surface features being adapted, when traversed by a pickup capable of compressing these surface features, to exert variations in pressure on the pickup from which pressure variations playback signals corresponding to the signal to be recorded can be derived.

According to a third aspect of the invention, there is provided a method of producing a record carrier comprising impressing a plurality of elastically compressible surface features on a carrier body, which features vary in dependence on the characteristics of signals to be stored, the surface features being adapted, when traversed by a pickup capable of compressing, the surface features to exert variations in pressure on the pickup from which pressure variations playback signal corresponding to the signals to be stored can be derived.

As a result of the invention, effective playing back can be obtained even at frequencies above the previously recognised limiting value caused by the elastic deformation of the material of the medium with conventional pickups. This fact, which has been confirmed by experiments in the meantime, can probably be explained as follows:

In the pickups hitherto usual, at and above said limiting value the pickup tip does not execute any further movement which is either useful or in any definite relationship with the deformation because the material of the medium is too soft to exert adequate pressure for mass acceleration on the tip. Since the conventional pickups only deliver an output quantity for amplitudes of movement of considerable magnitude, playing back with them is impossible at and above said limiting frequency.

Nevertheless, even in this range which cannot be utilised by the usual pickup technique the wall of the groove still has a certain effect on the pickup tip even if no substantial amplitude of movement is obtained. This effect is the pressure applied to the pickup engagement surface, which pressure is definitely related to the surface deformations and for the conversion of which into an electrical output quantity the conventional pickup is unsuitable, its effect remains relatively small even in the frequency ranges which are normally reproduced by the conventional pickup because the movable parts of the pickup are very lightly sprung.

This pressure which is exerted by the deformations on a pickup engagement surface in firm contact therewith and which is modulated with the signal as the pickup engagement surface passes over these deformations provides a useful quantity from which an output may be derived with the present invention.

The pressure is supplied by the surface of the medium and is analogous to the effects of a high internal resistance in a generator in that it can provide only very small move-

ments of the pickup tip (current in the generator analogy) but relatively great forces in the pickup tip (analogous to voltage in the generator). The mechanical power is therefore received by a pickup having a relatively high resistance to movement but which can provide an electrical output dependent on the pressure. For this purpose, a transducer is used, compressed in the direction of action of the pressure and providing an output dependent on the variation of the pressure in respect to time. Such a pressure sensitive pickup may be constructed in the form of a piezoelectric or piezomagnetic transducer, for example, or in the form of pressure-sensitive semiconductor component.

The essential difference from which is known, which leads to the new effect, consists in that the engagement surface of the transducer (or the engagement surface of a stylus rigidly connected to the transducer) no longer executes any movements of considerable magnitude because the inertia of the transducer/stylus is very great in comparison with known pickups and in general is considerably greater than the elasticity of the material of the medium. With such mechanically rigid pressure sensitive pickups, compressions which are considerably less than the depth of the deformations or surface features contained in the surface of the carrier medium are sufficient for the delivery of an electrical output voltage of sufficient amplitude for effecting playback of the recordings.

Whereas in a previously considered ideal conception of the playback of a recording, the material of the medium should be inherently rigid and the tip of the pickup infinitely flexible, so that the resilience necessary for the co-operation between the surfaces is provided by the pickup surface, these conditions are partially reversed in the system of the invention: the pickup transducer/stylus could be substantially inherently rigid and the distance of its engagement surface from the surface of the medium, considering this surface as being the plane of the surface before deformation, or the formation of the compressible surface features, could be constant, the resilience being localised primarily in the surface of the carrier medium.

With suitably chosen resilience characteristics for the material of the medium, the elastic compression of the surface of the carrier medium caused by the pressure of the stylus or the engagement surface of the transducer is considerably greater than the oppositely directed deflection of the engagement surface of the stylus or transducer resulting from the resilience of the medium.

During the play back, the surface of the carrier medium provided with the surface features or deformations is displaced past the engagement surface of the pickup which is to be regarded as substantially fixed in position and which exerts a pressure on the surface of the medium. If parts of the surface features or deformations which represent projections from the undeformed surface pass under the pickup, these projections are resiliently compressed generally to such an extent that their surface coincides with the undeformed surface for the short duration of the passage of the pickup. This leads to an increase in the pressure acting on the pickup surface. Conversely, there is a reduction in this pressure when, instead of projections, depressions in the surface of the medium pass below the surface of the pickup. The problem of holding the engagement surface in contact with the surface of the medium even in the latter case and so not allowing the pressure to drop to zero is a problem which can be solved in a simple manner by adjusting the static pressure of the pickup.

As a result of the invention, the elastic compression in the material of the medium is utilised for pressure modulation of the pressure sensitive transducer in the pickup. Accordingly, the elastic compression does not detract from the playback as it would with the conventional systems. Therefore, the frequency limit observed in these conventional systems is also overcome and effective playback becomes possible over a wide coherent frequency range far above the former limiting frequency and up to some Mcps. Thus the use of media resembling gramophone records for the storage of television picture and sound signals is brought within the bounds of possibility.

The natural resonance of the transducer member, when compressed in a direction away from the carrier surface, can be made sufficiently high, preferably in the vicinity of the required upper frequency limit, with the constructions at present available and undoubtedly not yet perfectly adapted to their purpose, in the form of an oscillator with small contractions. Since the damping is great as a result of the great internal resistance of the generator to movement, that is to say of the material of the medium, the natural resilience of the transducer member does not lead to any excessive distortion in the output quantity.

The compression or deformation to which the material of the medium is subjected during the playback should lie within the elastic range of the material in order to permit playing back without substantial wear of the medium. It is therefore a preferred feature of a carrier medium for a system according to the invention that its material and the extent of the surface features or deformations are selected in such a manner that the deformation of the surface of the carrier medium remains within the elastic range of the material of the medium at the prescribed playback speed. The playback speed is of

importance because it is known that a number of substances, particularly synthetically produced plastics materials based on copolymers of vinyl and chloride acetates have a flow limit depending on the length of time of loading in the sense that brief loading is taken up in the elastic range although this brief loading exceeds by many times the loads which can be taken up elastically under static action.

Since it is the obvious aim of one skilled in the art, for known reasons, to keep the wear low, the compressive force of the pick-up for playing back the recording on such a medium is selected in such a manner that it will not lead to a permanent deformation of a surface of the medium on which no recording is present at the prescribed relative speed of the surfaces in contact with one another. Accordingly, a rule governing the selection of material for the medium and the permissible deformation thereof may be stated as follows:—

If the surface features are considered as "protuberances" from the otherwise smooth surface, their height and cross-sectional area should be such that they can take up the bearing force of the engagement surface of the pickup by means of substantially elastic compression or deformation and, in order to avoid distortion, they should be compressable to the extent of becoming level with the non-protuberant smooth surface.

With mechanical co-operation between the recorded deformations in the surface of the medium and the pickup engagement surface in contact with this, it can be seen that with a constant modulus of elasticity, which is assumed to be predetermined, of the material of the medium, the amplitude of the force modulation is determined not only by the height of the deformation in the direction of the force but also by the area of the bearing cross-section of the deformed parts. This relationship which results from the utilisation of the elastic deformation for modulation of the compressive force opens the possibility of varying either the height of the deformed parts or the area of the bearing cross-section or both together, in accordance with variation in the signal magnitude, along the playback track of the medium.

One form of construction of the record medium using a variation in cross-section is obtained, for example, if the variation in cross-section is achieved by using a land of material between two grooves, which land is of a constant height but of a width varying with the signal magnitude, its surface being pressed in resiliently by the pickup engagement surface and then exerting a compressive force, depending on the width of the land, on the pickup engagement surface. Another form of construction with variation in cross-section is obtained by a mode of recording wherein the signal magnitude resides in the cross-sectional area of the protuberances or deformations so that these have different lengths in the direction of the relative movement between record medium and the pickup engagement surface. With this kind of recording, the width of the cross-sectional areas may be maintained constant or may also be variable along the playback path or track.

The mode of recording with variable length of the protuberances or deformations along the playback path or track is preferably used in conjunction with a recording signal in the form of a carrier oscillation modulated by the signal to be stored. The frequency resulting, during the playing back, from the individual protuberances or deformations along the playback track or path with constant spacing between their centres or their front faces may suitably be equal to the carrier frequency. As with pulse-duration modulation, the signal is reproduced with the corresponding carrier oscillation whose pulse length varies with the variable length of the deformation elements and converted directly into amplitude modulation of the compressive force by the pressure sensitive pickup.

For playback of such recordings, a suitable pickup has its sensing engagement surface constructed in such a manner that, in the direction of the playback path or track, it bears wholly or partially on the record medium over a distance which is greater than the longest carrier wavelength recorded and that, in a plan section taken in the same direction and perpendicular to the surface of the medium, it forms a boundary curve of different steepness at the leading and trailing ends of the engagement surface.

The wear is reduced as a result of the engagement surface of the pickup resting on numerous peaks of protuberances or deformations. The compressive force at the engagement surface is then proportional to the particular total value of the forces of the individual protuberances or deformations.

On the above-mentioned assumption that the pickup is in contact with the surface of the medium over a distance, in the direction of the playback track or path, which is greater than the longest wavelength recorded, the resulting alternating force is the greater, the greater the asymmetry of the leading and trailing ends of the pickup stylus or transducer. The resulting force reaches a maximum value when the steepness of the trailing end is infinite. If possible, therefore, the trailing end should form an angle of 90° with the adjacent part of the engagement portion in engagement with the carrier. Angles which are less than 90° lead to the same result.

It has already been mentioned that the pickups in current use are velocity sensitive pickups in the sense that they deliver an electrical output quantity, the instantaneous value

of which is proportional to the velocity of motion of the pickup tip. Associated with this is the fact that for reproduction of constant signal amplitudes independent of frequency, an amplitude pre-emphasis must be carried out in such a manner that the amplitude of the protuberances or deformations on the medium becomes inversely proportional to the frequency. For low frequencies, this leads to undesirably large deformation amplitudes.

The system according to the invention is also free of this disadvantage. In it, the instantaneous value of the electrical output quantity is in linear relationship with the amplitude of the signal recording, expressed by the height or the cross-sectional area of the protuberances or deformations. The changes in compressive force acting on the pickup is proportional to the recorded amplitude and proportional to the wavelength so that no de-emphasising of the lower frequencies occurs during the reproduction. Therefore, with a recording process for a sysem according to the invention, the widening of the grooves, otherwise usual for the recording of lower frequencies in gramophone discs, can be dispensed with and the ampliture of the protuberances or deformations in the surface of the medium can be maintained substantially independent of the recorded frequency.

The dependence of the resulting changes in force on the wavelength even enables the low frequencies to be recorded with a lower amplitude and a narrower groove width and hence with reduced spacing between the grooves. Thus a method of recording wherein the amplitude of the protuberances or deformations in the surface of the medium is maintained substantially proportional to the frequency with a constant amplitude of the signal, in the transmission range is possible. This also leads to the possibility of producing a medium wherein the width of the grooves and the spacing of the grooves are maintained proportional to the recorded frequency.

The kind of recording whereby the protuberances or deformations are formed in the surface of the medium which cause compression of the transducer in directions including perpendicular to or inclined in relation to the surface of the unrecorded medium can be used and may accordingly utilise different formations of the protuberances or deformations. As a well-tried type of recording which can be used in a simple manner for the purpose of the system, a grooved hill-and-dale recording is recommended as suitable.

During the playing-back, a variation in time of the compressive force acting on the pickup is caused corresponding to the protuberances or deformations of the surface. If the signal is recorded directly as protuberances or deformations, this variation in the compressive force is a true reproduction of the signal, obtained directly, in the ideal case where no distortion occurs.

If a carrier oscillation is amplitude-modulated with the signal and the result is recorded as a signal quantity, then with a pickup engagement surface extending over numerous wavelengths of the carrier oscillation but shorter than the shortest signal wave-length, the playing back automatically produces a variation in the compressive force which contains the signal superimposed on the carrier oscillation which can be filtered out.

If the carrier oscillation is frequency-modulated with the signal, then the compressive force is likewise a frequency-modulated carrier oscillation. Accordingly, the electrical output quantity must be subjected to a frequency demodulation known per se in order to recover the signal.

The invention will now be further described by way of example with reference to the accompanying drawings, in which:—

Figure 1 shows a basic diagram for a system according to the invention; and

Figure 2 to Figure 4 show parts of a medium for a system according to the invention with different constructions of the deformations in the surface of the medium.

The co-operating parts of the pickup 1 and of the medium 2 are illustrated greatly enlarged in Figure 1. The deformations or protuberances 3 are in the form of individual elements separated from one another by gaps and in this form can be used for the indirect recording through the modulation of a carrier oscillation as already mentioned. The leading edge of the pickup engagement surface is rounded with a large radius of curvature, the trailing edge is perpendicular to the surface of the medium and has a relatively sharp edge or is rounded with a considerably smaller radius of curvature. The arrow shows the direction of motion of the medium in relation to the pickup.

From the diagrammatic illustration, it will be seen that the protuberances or deformations 3 which pass below the engagement surface of the pickup are compressed within the elastic range of the material. Even the parts of the medium which are close to the surface and which are between the projecting deformation members undergo a certain compression. The elasticity of these parts of the material is indicated diagrammatically by the spring symbols 4 in the left-hand portion of Figure 1; the spring symbols 5 below the trailing end of the pickup indicate the elasticity of the compressed portions of the material. Consequently, an increased compressive force is exerted on the pickup by these portions.

Figure 2 shows a portion of the medium 2 which is provided, on its surface, with grooves, the two sides 6 and 7 of which have the deformations 3 in the form of wave trains which are recorded in the groove as in a known

hill-and-dale recording. The layers 8, which are adjacent to the surfaces of the grooves and are deformed during playback, are distinguished by double hatching. The bearing of the engagement surface of the pickup against the two sides of the grooves is indicated by the arrows 9. Thus the engagement surface engages the groove on both surfaces thereof.

In an illustration corresponding to that in Figure 2, Figure 3 shows a portion of a medium 2 in the grooves of which, only the side 10 shows deformations 3 in the form of a wave train, while the side 11 is undeformed. The layer 18 adjacent to the side 10 of the groove is deformed during playback and is indicated by the double hatching of the section face. The arrow 12 designates the line of the groove surface with which the pickup co-operates and compresses to receive the modulated compressive force. The embodiment shown in Figure 3 may be termed flank recording.

Figure 4 is a similar illustration for the case where it is not the height of the deformations but the width of a land 14 carrying the deformations which is a representation of the signal quantity. Only the side 15 carries such deformations, the side 16 is undeformed. Playback is effected at the upper edge of the land 14 as indicated by the arrows 13. If a pressure is exerted by the pickup on the land in the direction of these arrows, then the material regions 28 and 29 emphasised by double hatching are deformed. At the broadest point in the land, in the region 28, a greater compressive force is necessary to deform the land then at the narrowest point in the region 29. The compressive force reacting on the pickup is therefore modulated according to the width of the land. Accordingly, the term width recording may be used for this embodiment.

WHAT WE CLAIM IS:—

1. A record carrier having stored signals recorded therein comprising a carrier body, a plurality of elastically compressible surface features on the carrier body, which features vary in dependence on the characteristics of the stored signal, the surface features being adapted, when traversed by a pickup capable of compressing the surface features, to exert variations in pressure on the pickup from which pressure variations playback signals corresponding to the stored signals can be derived.

2. A record carrier as claimed in Claim 1, wherein the surface features comprise a plurality of projections extending in the form of a track.

3. A record carrier as claimed in Claim 2, wherein the carrier body is disc like.

4. A record carrier as claimed in Claim 3, wherein the projections are situated in a spiral groove.

5. A record carrier as claimed in Claim 4, wherein the width of the groove is constant and the turns of the spiral are equispaced.

6. A record carrier as claimed in Claim 4, wherein the width of the groove and the spacing of the turns of the groove are proportional to the frequency of the signal to be stored therein.

7. A record carrier as claimed in Claim 4, 5 or 6, wherein the projections represent a signal of a frequency in the Mcps range.

8. A record carrier as claimed in Claim 4, 5, 6 or 7, wherein the projections represent a television picture signal.

9. A record carrier as claimed in Claim 8, wherein the projections represent a television picture and sound signal.

10. A record carrier as claimed in any one of Claims 4 to 9, wherein the projections represent a modulated carrier wave signal.

11. A record carrier as claimed in Claim 10, wherein the projections represent a frequency modulated carrier wave signal.

12. A record carrier as claimed in Claim 10, wherein the projections represent an amplitude modulated carrier wave signal.

13. A record carrier as claimed in any one of Claims 4 to 12, wherein the amplitude of the projections for a given amplitude of the signal stored is substantially independent of the frequency of the signal stored.

14. A record carrier as claimed in any one of Claims 4 to 12, wherein the amplitude of the projections for a given amplitude of the signal stored is proportional to the frequency of the signal stored.

15. A record carrier as claimed in any one of Claims 4 to 14, wherein the height of the projections varies in dependence on characteristics of the signal stored.

16. A record carrier as claimed in any one of Claims 4 to 15, wherein the area of the projections varies in dependence on characteristics of the signal to be stored.

17. A record carrier as claimed in any one of Claims 4 to 16, wherein the projections form a "hill and dale" recording.

18. A record carrier as claimed in any one of Claims 4 to 16, wherein the projections form a varying area land between grooves, which area varies in dependence on the signal stored.

19. A record carrier as claimed in any one of Claims 4 to 18, wherein the projections are formed on only one side of the groove.

20. A record carrier as claimed in any one of Claims 4 to 18, wherein the projections are formed on both sides of the groove.

21. A record carrier as claimed in any one of Claims 4 to 20, wherein the material of the record carrier is selected such that when engaged by a pickup capable of compressing the projections with a given pressure and at a given traverse speed, compression of

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hill-and-dale recording. The layers 8, which are adjacent to the surfaces of the grooves and are deformed during playback, are distinguished by double hatching. The bearing of the engagement surface of the pickup against the two sides of the grooves is indicated by the arrows 9. Thus the engagement surface engages the groove on both surfaces thereof.

In an illustration corresponding to that in Figure 2, Figure 3 shows a portion of a medium 2 in the grooves of which, only the side 10 shows deformations 3 in the form of a wave train, while the side 11 is undeformed. The layer 18 adjacent to the side 10 of the groove is deformed during playback and is indicated by the double hatching of the section face. The arrow 12 designates the line of the groove surface with which the pickup co-operates and compresses to receive the modulated compressive force. The embodiment shown in Figure 3 may be termed flank recording.

Figure 4 is a similar illustration for the case where it is not the height of the deformations but the width of a land 14 carrying the deformations which is a representation of the signal quantity. Only the side 15 carries such deformations, the side 16 is undeformed. Playback is effected at the upper edge of the land 14 as indicated by the arrows 13. If a pressure is exerted by the pickup on the land in the direction of these arrows, then the material regions 28 and 29 emphasised by double hatching are deformed. At the broadest point in the land, in the region 28, a greater compressive force is necessary to deform the land then at the narrowest point in the region 29. The compressive force reacting on the pickup is therefore modulated according to the width of the land. Accordingly, the term width recording may be used for this embodiment.

WHAT WE CLAIM IS:—

1. A record carrier having stored signals recorded therein comprising a carrier body, a plurality of elastically compressible surface features on the carrier body, which features vary in dependence on the characteristics of the stored signal, the surface features being adapted, when traversed by a pickup capable of compressing the surface features, to exert variations in pressure on the pickup from which pressure variations playback signals corresponding to the stored signals can be derived.

2. A record carrier as claimed in Claim 1, wherein the surface features comprise a plurality of projections extending in the form of a track.

3. A record carrier as claimed in Claim 2, wherein the carrier body is disc like.

4. A record carrier as claimed in Claim 3, wherein the projections are situated in a spiral groove.

5. A record carrier as claimed in Claim 4, wherein the width of the groove is constant and the turns of the spiral are equispaced.

6. A record carrier as claimed in Claim 4, wherein the width of the groove and the spacing of the turns of the groove are proportional to the frequency of the signal to be stored therein.

7. A record carrier as claimed in Claim 4, 5 or 6, wherein the projections represent a signal of a frequency in the Mcps range.

8. A record carrier as claimed in Claim 4, 5, 6 or 7, wherein the projections represent a television picture signal.

9. A record carrier as claimed in Claim 8, wherein the projections represent a television picture and sound signal.

10. A record carrier as claimed in any one of Claims 4 to 9, wherein the projections represent a modulated carrier wave signal.

11. A record carrier as claimed in Claim 10, wherein the projections represent a frequency modulated carrier wave signal.

12. A record carrier as claimed in Claim 10, wherein the projections represent an amplitude modulated carrier wave signal.

13. A record carrier as claimed in any one of Claims 4 to 12, wherein the amplitude of the projections for a given amplitude of the signal stored is substantially independent of the frequency of the signal stored.

14. A record carrier as claimed in any one of Claims 4 to 12, wherein the amplitude of the projections for a given amplitude of the signal stored is proportional to the frequency of the signal stored.

15. A record carrier as claimed in any one of Claims 4 to 14, wherein the height of the projections varies in dependence on characteristics of the signal stored.

16. A record carrier as claimed in any one of Claims 4 to 15, wherein the area of the projections varies in dependence on characteristics of the signal to be stored.

17. A record carrier as claimed in any one of Claims 4 to 16, wherein the projections form a "hill and dale" recording.

18. A record carrier as claimed in any one of Claims 4 to 16, wherein the projections form a varying area land between grooves, which area varies in dependence on the signal stored.

19. A record carrier as claimed in any one of Claims 4 to 18, wherein the projections are formed on only one side of the groove.

20. A record carrier as claimed in any one of Claims 4 to 18, wherein the projections are formed on both sides of the groove.

21. A record carrier as claimed in any one of Claims 4 to 20, wherein the material of the record carrier is selected such that when engaged by a pickup capable of compressing the projections with a given pressure and at a given traverse speed, compression of

the record carrier remains within the elastic range of the material.

22. A record carrier as claimed in any one of Claims 4 to 20, wherein the material of the record carrier is selected such that when engaged by a pickup capable of compressing the projections to the extent, where they are completely flattened at a given traverse speed, the compression of the record carrier remains within the elastic range of the material.

23. A record carrier as claimed in any one of Claims 4 to 22, wherein the record carrier is made from synthetic plastics material.

24. A record carrier as claimed in Claim 23, wherein the synthetic plastics material is based on a copolymer of vinyl or chloride acetates.

25. A method of recording signals on a record carrier comprising converting the signal to be recorded into mechanical vibrations and impressing these mechanical vibrations on to a carrier body in the form of elastically compressible surface features which vary in dependence on the characteristics of the signal to be stored, these surface features being adapted, when traversed by a pickup capable of compressing these surface features, to exert variations in pressure on the pickup from which pressure variations playback signals corresponding to the signal to be recorded can be derived.

26. A method as claimed in Claim 25, and comprising impressing the mechanical vibrations on to a carrier body in the form of a plurality of elastically compressible projections extending in the form of a track.

27. A method as claimed in Claim 26, wherein the mechanical vibrations are impressed on to a disc like carrier body.

28. A method as claimed in Claim 27, wherein the track is formed as a spiral groove in which the projections are situated.

29. A method as claimed in Claim 28, wherein the signal to be recorded is converted into a frequency modulated carrier wave signal.

30. A method as claimed in Claim 28 or 29, wherein the signal to be recorded is a television picture signal.

31. A method as claimed in Claim 25, and comprising impressing the mechanical vibrations on the carrier body in such a way as to produce a record carrier as claimed in any one of Claims 2 to 24.

32. A method of producing a record carrier comprising impressing a plurality of elastically compressible surface features on a carrier body, which features vary in dependence on the characteristics of signals to be stored, the surface features being adapted when traversed by a pickup capable of compressing, the surface features to exert variations in pressure on the pickup from which pressure variations playback signal corresponding to the signals to be stored can be derived.

33. A method as claimed in Claim 32, and comprising impressing on the carrier body a plurality of elastically compressible projections as said surface features, the projections extending in the form of a track.

34. A method as claimed in Claim 33, wherein the projections are impressed on a disc like carrier body.

35. A method as claimed in Claim 34, wherein the track is formed as a spiral groove in which the projections are situated.

36. A method as claimed in Claim 35, wherein the projections are impressed in a form which represents a frequency modulated carrier wave signal.

37. A method as claimed in Claim 35 or 36, wherein the projections are impressed in a form which represents a television picture signal.

38. A method as claimed in Claim 32, and comprising impressing the plurality of elastically compressible surface features on the carrier body in such a way as to produce a record carrier as claimed in any one of Claims 2 to 24.

39. A record carrier having stored signals recorded therein substantially as described herein with reference to the drawings.

40. A method of recording signals on a record carrier substantially as described herein with reference to the drawings.

41. A method of producing a record carrier substantially as described herein with reference to the drawings.

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